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ANNUAL REPORT

OF THE

PUBLIC HEALTH COMMISSIONER WITH THE GOVERNMENT OF INDIA

FOR 1935.

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1935 & 1936
(Two Vols. together)

Volume I.

With Appendices.

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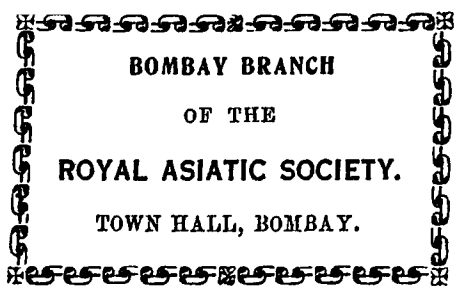

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" With the compliments of Colonel A.J.H. Russell,
C.B.E., K.H.S., I.M.S., Public Health Commissioner
with the Government of India, New Delhi/Simla"

ANNUAL REPORT

OF THE 1935 & 1936

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FOR 1935.

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ANNUAL REPORT OF THE PUBLIC HEALTH COMMISSIONER WITH THE GOVERNMENT OF INDIA FOR 1935.

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7. Vaccination graph showing percentages of successful cases to total operations during 1935-36. (*Facing page* 114).

KEY
MAP OF INDIA
(SHOWING PROVINCES AND DISTRICTS).
REFERENCE
REFERENCES
Scale 1 Inch = 160 Miles.
Miles 160 120 80 40 0 160 320 480 Miles
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Annual Report of the Public Health Commissioner with the Government of India for 1935.

VOLUME I.

SECTION I.

ON THE STATE OF THE PUBLIC HEALTH IN BRITISH INDIA AND SOME INDIAN STATES.

Introduction.

1. The principal statistical data for British India for the year 1935 are given below :—

Mid-year estimated population		278,199,545
Area (square miles)		890,116
Density per square mile		312
Births	Number	9,698,794
	Rate p. m.	35
Deaths	Number	6,578,711
	Rate p. m.	24
Infantile death rate per 1,000 live-births		164
Vital Index		147

Since the 1931 census was taken, India has enjoyed five years of comparatively uniform health conditions, by which is meant that no violent epidemics have been experienced. The year under review was, if anything, less unhealthy than usual. This is evidenced by the facts that recorded births numbered 410,000 more than those of 1934 and total deaths were less by 288,000. As the crude birth rate increased by 1 p. m. and the crude death rate diminished by a corresponding unit, the natural increase was 11 p.m. as compared with the average of 12 p. m. for the five-year period 1931-35.

The total mortality from the three principal epidemic diseases,—cholera, plague and small-pox,—decreased by 24,000 as compared with 1934, but this was more than covered by the large reduction in deaths from plague which fell from 80,000 in 1934 to 32,000 in 1935. The cholera mortality curve which had been rising during the previous two years continued to rise during 1935 and the total deaths amounted to 217,000, the highest figure for the past three years. The indications are, however, that the present cholera wave has now passed its peak. In regard to smallpox a further increase was recorded, the number of cases being 281,000 and the total deaths numbering about 91,000 as against 84,000 in 1934. As regards the other large groups of registered deaths, the gross total shows little variation from those of the previous year, although the "fevers" group is lower by over 200,000.

Large as these major epidemic figures are, it must be remembered that there are other diseases which cause much greater havoc, although that is

perhaps of a less dramatic nature. The most important of these is of course malaria. It has been estimated that deaths from malaria during 1935 amounted to 1,680,000 or about 44% of the total recorded 'fevers' deaths. The problems presented by malaria in this country are perhaps the most difficult of the many public health problems demanding solution. Some of these have been discussed in later paragraphs of this report where reference has also been made to the question of quinine. An attempt has been made to indicate in tabular and other statements the amount of quinine consumed per head of the population in different provinces. These amounts are without exception ridiculously small as compared with the needs of the people, but the problem of providing adequate supplies of this drug at cheap rates is by no means easy of solution.

Tuberculosis is another disease whose incidence has increased rapidly during recent years and which is now causing a heavy mortality, particularly in the urbanised and industrialised areas. It is impossible to quote figures which would give an accurate indication of the degree to which this infection has now permeated the general population, but there seems little doubt that pulmonary tuberculosis at least is working havoc, not only in the overcrowded urban centres, but also in various groups of the rural population where there exists a high degree of susceptibility to attack. Further details in regard to tuberculosis will be found in Section II of this report.

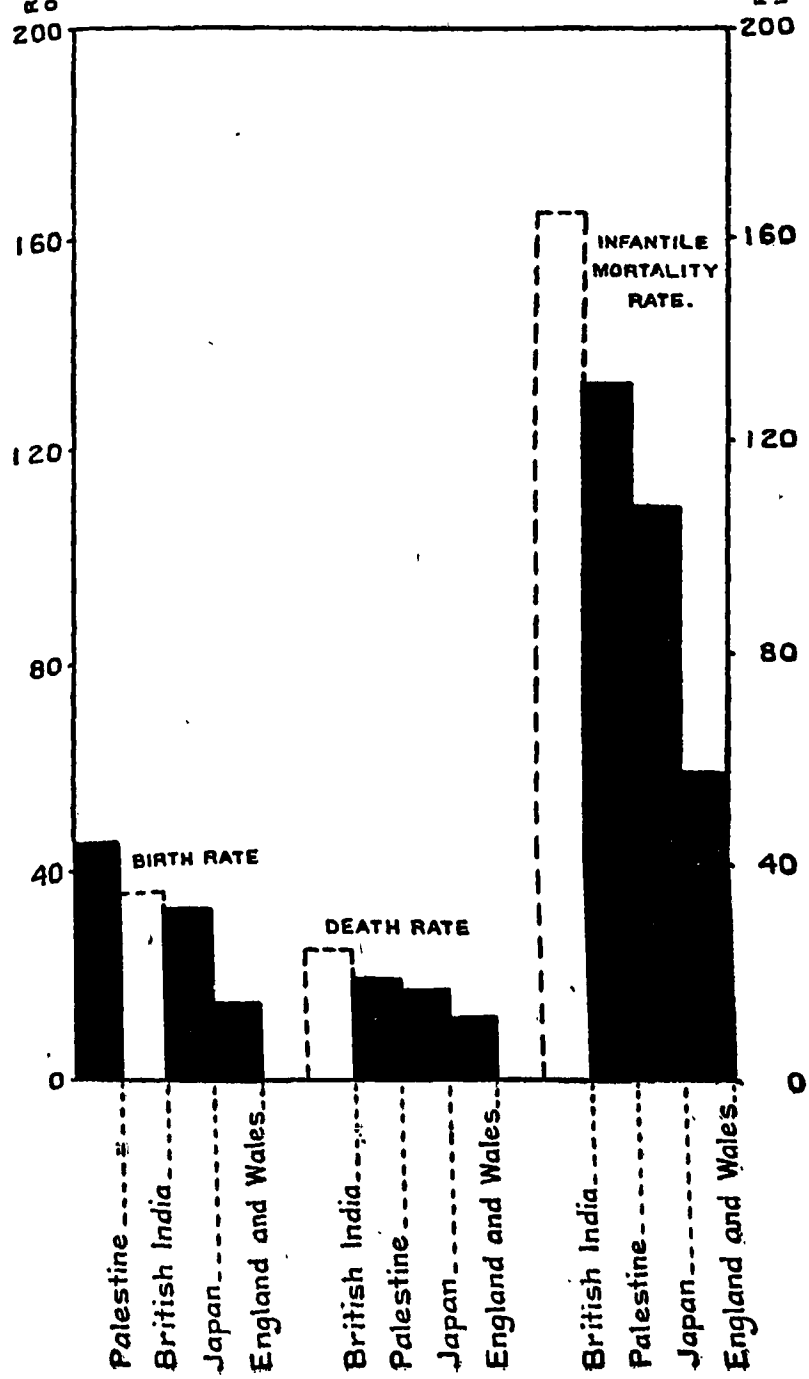
While leprosy may not be the cause in India of such heavy mortality as malaria and tuberculosis, nevertheless the new knowledge gained during recent years as to the incidence of this disease has indicated that it is one of the major health problems of the country. The intensive surveys which have been carried out in different areas have made it clear that leprosy is much more widespread than had previously been recognised. Careful investigation in different groups of villages, for instance, has shown that the incidence of the disease may be as high as 5-7% and, whilst many of the cases seem to be of a relatively mild type, it cannot be doubted that the presence of well over one million leprous cases scattered throughout the general population constitutes a grave danger to the public health.

Finally, mention must also be made here of two other sections of the population amongst which a heavy mortality occurs. Figures given in this section of the report show that in 1935 about 1¼ million infants died before they reached the age of one year, whilst approximately 150,000 women died in childbirth or from causes associated with childbirth.

These five causes of high mortality have not been brought together, merely because each is responsible for a large number of deaths, although at first sight there seems to be no other common feature between malaria, tuberculosis and leprosy and infant and maternal mortality. We know the specific causal agent of the first three and have fairly accurate knowledge of those responsible for a high percentage of infant and maternal deaths, but in all five groups there exists a common predisposing aetiological factor which is of a vital importance. Recent scientific research has in fact indicated that were this factor eliminated, it would without doubt be possible to effect large reductions in the continuous heavy mortality recorded under all of these headings. This predisposing factor is malnutrition. It has long been known that malnutrition produces a lowered resistance to disease; this has frequently been illustrated by the great susceptibility of the people of India to malaria, bowel infections and other diseases during times of scarcity or famine. But, until more recent times, few realised the extent to which malnutrition exists in India, although research workers and public health authorities had for

No. 1

A COMPARISON OF BIRTH, DEATH AND INFANTILE MORTALITY RATES OF INDIA WITH SOME OTHER COUNTRIES IN 1935.



long inferred that this factor was of importance. Investigations carried out in recent years and months have now proved that considerable percentages of the population of India present many and diverse malnutritional conditions in greater or less degree and that these are due for the most part to qualitative defects in the ordinary diets of the people.

No preventive campaign against malaria, against tuberculosis or against leprosy, no maternity relief or child welfare activities are likely to achieve any great success unless those responsible recognise the vital importance of this factor of defective nutrition and from the very start give it their most serious attention. Abundant supplies of quinine and the multiplication of tuberculosis hospitals, sanatoria, leprosy colonies and maternity and child welfare centres are no doubt desirable, if not essential, but none of these go to the root of the matter. The first essentials for the prevention of disease are a higher standard of health, a better physique and a greater power of resistance to infection. These can only be attained if the food of the people is such as will give all the physiological and nutritional requirements of the human frame. This question is obviously closely correlated with that of population and with the planning of sufficient and suitable food supplies. The question of numbers is the subject of later comment; that of food supplies is one of primary concern to the central and provincial agricultural departments and they may be expected to utilise available information on nutritional needs in planning food crops and food production. To obtain the best results, a close liaison must be maintained between the human nutritional research workers and those who can bring influence to bear on the food producer. Only when that liaison has been able to effect the quantitative and qualitative improvements in food supplies which research has shown to be so urgently necessary, will it be possible to anticipate any great or permanent reduction in the incidence of those diseases which at present take such a pitiful toll of human life in this country.

In the chart facing page 2 and in Table I (*i*) the principal vital statistics for British India during 1935 are compared with the corresponding figures of a number of other countries.

TABLE I (*i*).

	Birth rate per mille.	Death rate per mille.	Natural increase per mille.	Infantile death rate per 1,000 births.
British India	**35**	**24**	**11**	**164**
England and Wales	15	12	3	57
Federated Malay States	36	20	16	144
Palestine	45	19	26	131
Japan	32	17	15	107
Egypt	42	27	15	161

Population.

2. Tables I (*ii*) and I (*iii*) give the estimated mid-year population of British India by provinces and by sex and age. It is to be noted that, of the large provinces, Bengal shows much the smallest percentage increase.

TABLE I (*ii*).

	Estimated population, 30th June 1934.	Excess of births over deaths.	Estimated population, 30th June 1935.	Percentage increase.	Total from 1931 to June 1935.
British India .	275,753,570	2,445,975	278,199,545	0·9	4·7
N.-W. F. P. .	2,433,011	25,556	2,458,567	1·1	4·3
Punjab . .	24,683,408	338,645	25,022,053	1·4	6·6
Delhi . .	668,160	4,410	672,570	0·7	5·7
U. P. . .	50,559,397	338,816	50,898,213	0·7	5·1
B. & O. . .	39,050,029	277,720	39,327,749	0·7	4·3
Bengal . .	50,837,178	394,255	51,231,433	0·8	2·7
C. P. . .	16,237,707	122,279	16,359,986	0·8	5·4
Bombay . .	22,670,283	222,775	22,893,058	1·0	5·0
Madras . .	47,152,136	516,046	47,668,182	1·1	5·5
Coorg . .	164,187	603	164,790	0·4	0·9
Assam . .	8,197,605	79,494	8,277,099	1·0	4·4
Burma . .	12,525,656	123,460	12,649,116	1·0	4.4
Ajmer-Merwara	574,813	1,916	576,729	0·4	3·0

TABLE I (*iii*).

	Male.	Female.	Total.
All ages	143,328,624	134,870,921	278,199,545
0—5 years	20,506,816	20,812,050	41,318,866
5—10 „	18,785,564	17,005,966	35,791,530
10—15 „	17,249,464	15,131,099	32,380,563
15—20 „	13,065,202	12,971,782	26,036,984
20—30 „	24,936,345	24,792,225	49,728,570
30—40 „	20,538,128	18,297,654	38,835,782
40—50 „	14,112,837	12,332,181	26,445,018
50—60 „	8,431,158	7,826,964	16,258,122
60 years and upwards . .	5,703,110	5,701,000	11,404,110

The last census was taken in 1931 so that the year under report covers the middle of the present intercensal period. During these five years little has happened to disturb the customary large additions to numbers. As a result, the annual natural increases in population have been fairly regular and have averaged as high as 12 % over the quinquennium, in spite of a temporary decrease to 9 % in 1934. At no period in the recorded history of Indian vital statistics has the natural increase of population maintained such a high level and, in British India alone, approximately 15 millions have been added to the population since the last census. On the reasonable assumption that the same rate of increase has occurred in the Indian States, the population in India as a whole has increased since 1931 by 5%, bringing the total estimated number to well over 370 millions. The fact that registration of births is defective only means that the actual population is even higher than this estimate would indicate. The percentage of error in Indian vital statistics may make it difficult to draw definite inferences from the recorded figures of a single year. Over a period of years, however, the trend of events becomes obvious even to the amateur statistician and there seems to be no

doubt that, barring violent epidemic outbreaks, the population of India by 1941 will exceed the 400 million mark which was forecast in this report some years ago.

The objection may be made that forecasts of population in India are both dangerous and difficult. In his recent book on population Carr Saunders (1936) has, for instance, pointed out that " it is not possible to forecast the future population of India on lines similar to those employed when dealing with other countries; for there is no question of projecting into the future present birth and death rate trends with appropriate modifications ". He also draws attention to the fact that after failure of monsoon rains " the high mortality during the bad seasons has always been due to epidemics which are enabled to spread on account of the enfeebled condition of the population consequent on lack of sufficient food ". In addition he pertinently adds that " the future population of India will, therefore, be governed by such expansion of oppertunities for subsistence as may take place ". These statements, might be taken to deny the possibility of accuracy for such a forecast as has been referred to, but it is to be noted that what Carr Saunders has in mind is " a long term prediction of India's population ". Dr. Raja of the All-India Institute of Hygiene and Public Health, Calcutta, has recently published a paper entitled " A forecast of population in India at the census of 1941 ". His forecast deals with a date only six years ahead so that it completely avoids the errors of a long term prediction. Recognising the violent changes which have characterised population growth since 1872, when the first census was taken, and that Indian vital statistics are too inaccurate to be used with confidence, the author has attempted to arrive at an estimate of the 1941 population by making an assessment of the trend of those events which influence population growth.

Growth of population in any country is determined by four factors, birth rates, death rates and figures for immigration as well as for emigration. As migration during the past decade has ceased to be of any importance to India, this factor has been omitted. The birth rate in British India has been fairly steady from the beginning of the present century, but the death rate has tended to decrease from 1921 onwards. Specific mortality rates were worked out for both males and females for the period 1921-33, using estimated populations for each year, and Dr. Raja found that the trend of mortality was downwards for all age groups except that of " 60 years and upwards " in the case of both sexes. The conclusion drawn is that the fall in mortality shown in recent years is real and that the death rate is not likely to show an upward trend at least in the near future. That being so, the application of further statistical analyses was justified and by two separate processes figures of approximately 402 and 400 millions respectively were obtained for the estimated population of India as a whole in 1941. These figures represent an increase of about 13% during the present intercensal period, a rate which is comparable with the actual increase of 12% which has occurred during the years 1931-35. Provided the next five years keep free from abnormal epidemic or famine conditions, the enumerated population of India in 1941 is therefore likely to approximate to 400 millions.

Migration.—Only 13,267 persons from Madras Presidency emigrated to Malaya and 8,795 to Ceylon. Immigrants from the same countries numbered 12,431, excluding those who returned at their own expense and 403 from Fiji, Mauritius and South Africa. Immigrants to and emigrants from Burma by the sea route numbered 273,841 and 234,246 respectively. A total of 21,630 persons emigrated to Assam.

Live-births.

3. *British India.*—Excluding Europeans and Anglo-Indians, 9,698,794 live-births were registered during 1935, this figure being 4% in excess of the figure of 1934 and 6% more than the quinquennial mean, whilst it is also the highest number ever recorded in India. The crude birth rate was 34·9 p. m. of the estimated population. The birth rates for previous years were 33·7 p. m. in 1934, 35·5 p. m. in 1933, 33·7 p. m. in 1932, 34·3 p. m. in 1931, 35·7 p. m. in 1926-30 (average) and 33·4 p. m. in 1921-25 (average). Still births have been excluded and details of these will be found in a later paragraph.

Table I (*iv*) gives numbers of registered births and rates *per mille* for both sexes based on the estimated populations for the various provinces.

TABLE I (*iv*).

	Births.			Rate per mille.			
	M.	F.	Total.	M.	F.	Total.	
						1935.	1934.
BRITISH INDIA .	5,041,943	4,656,851	9,698,794	18·1	16·7	34·9	33·6.
N.-W. F. P. . .	43,094	32,898	75,992	18	13	31	30
Punjab . . .	564,858	504,280	1,069,138	23	20	43	38
Delhi . . .	14,883	13,978	28,861	22	21	43	37
U. P. . . .	925,738	819,098	1,744,836	18	16	34	35
B. & O. . .	671,582	633,998	1,305,580	17	16	33	32
Bengal . . .	848,369	785,760	1,634,129	17	15	32	29
C. P. . . .	356,913	339,891	696,804	22	21	43	43
Bombay . . .	419,470	387,519	806,989	18	17	35	34
Madras . . .	855,779	815,407	1,671,186	18	17	35	35
Coorg . . .	2,226	1,953	4,179	13	12	25	25
Assam . . .	123,668	116,230	239,898	15	14	29	30
Burma . . .	203,885	195,888	399,773	16	16	32	29
Ajmer-Merwara .	11,478	9,951	21,429	20	17	37	34

In N.-W. F. P. the number of recorded births was the second highest on record; the figure of 399,773 births in Burma was a record. In Bombay, the figure was the largest during the last quinquennium. Sylhet district was largely responsible for the decreased number of births in Assam, but an investigation carried out in that district did not reveal any specific cause for the continued fall in the birth rate, although the concomitant increase in deaths is suggestive of deterioration in health conditions.

The male rate was higher than the female rate in every province; the number of males born per 100 females was 108 for British India and varied between 131 in N.-W. F. P. and 104 in Burma. Table D in Appendix I on page 214 gives details.

Registered births in rural areas totalled 8,752,220; in urban areas 946,574. The corresponding rates *per mille* were 35 and 34 respectively. In many municipal towns, where M. O. Hs. are employed, the registration of births is carried out more accurately than in other areas and probably urban rates are more reliable than those for rural areas. The rural rate continued to exceed the urban in Delhi, Punjab, B. & O., Bengal, Bombay and Madras; in N.-W. F. P., U. P., C. P., Coorg, Burma and Ajmer-Merwara it was lower. Table C on page 214 gives further particulars for rural and urban areas. The D. P. H., B. & O. makes the following remarks in discussing the

birth rates of that province and these are perhaps equally applicable to other parts of India :—

"The higher birth rate in the rural areas as compared to the urban birth rate appears to be due to the population of the rural areas (*i*) being more than that in the urban areas, (*ii*) being poor illiterate agriculturists among whom early marriage is encouraged and children are regarded as an asset, (*iii*) any manner of birth control being unknown to them, and (*iv*) the number of married females being greater in villages whence many married men go to earn their living in towns".

Birth rates for the chief communities are again available for ten provinces but under the existing system of registration these figures are of doubtful value. Rates calculated on the basis of the estimated number of women of childbearing age, 15—40 years, have been included in Table I (*v*).

TABLE I (*v*).

	Female population, 15—40 years.	Total births.	Rate p.m.
British India	**56,048,234**	**9,698,794**	**173**
N.-W. F. P.	469,814	75,992	162
Punjab	4,425,326	1,069,138	241
Delhi	126,019	28,861	229
U. P.	9,983,988	1,744,836	175
B. & O.	8,124,855	1,305,580	161
Bengal	10,618,238	1,634,129	154
C. P.	3,347,970	696,804	208
Bombay	4,562,919	806,989	177
Madras	10,084,500	1,671,186	166
Coorg	33,402	4,179	125
Assam	1,600,006	239,898	150
Burma	2,559,283	399,773	156
Ajmer-Merwara	111,914	21,429	191

Natural increases accruing from excess of births over deaths for decennial periods from 1871 to 1930 and for individual years from 1931—35 are given in Table I (*vi*).

TABLE I (*vi*).

	Annual number of births.	Birth rate p. m.	Annual number of deaths.	Death rate p. m.	Annual excess of births over deaths.
1871—1880	Not available.		3,540,202	20	..
1881—1890	4,565,687	24	5,058,578	26	492,891
1891—1900	7,174,694	34	6,662,417	31	512,277
1901—1910	8,591,136	38	7,657,513	34	933,623
1911—1920	8,810,018	37	8,142,364	34	667,654
1921—1930	8,345,364	35	6,347,063	26	1,995,301
1931	9,135,890	35	6,615,099	25	2,520,791
1932	9,054,506	34	5,805,666	22	3,248,840
1933	9,678,876	36	6,096,787	22	3,582,089
1934	9,288,897	34	6,856,244	25	2,432,653
1935	**9,698,794**	**35**	**6,578,711**	**24**	**3,120,083**

Table I (*vii*) gives births by quarters of the year. As usual, the largest number was recorded in the fourth and the lowest in the second quarter. The third quarter recorded an increase of 238,498 births or 11% and the fourth quarter an increase of 281,998 or 10% over the figures for 1934.

TABLE I (*vii*).

	1st Quarter.	2nd Quarter.	3rd Quarter.	4th Quarter
British India	**2,256,236**	**2,088,587**	**2,511,042**	**2,842,879**
N.-W. F. P.	20,341	16,825	19,115	19,711
Punjab	248,684	203,899	288,686	327,869
Delhi	5,598	5,196	8,662	9,405
U. P.	385,925	344,280	493,075	521,556
B. & O.	305,360	285,469	330,295	384,456
Bengal	446,702	351,880	305,939	529,608
C. P.	154,181	152,105	201,128	189,390
Bombay	192,524	184,327	217,356	212,782
Madras	338,212	395,139	484,248	453,587
Coorg	1,040	1,154	1,092	893
Assam	64,929	47,607	49,073	78,289
Burma	38,006	96,258	106,490	109,019
Ajmer-Merwara	4,734	4,398	5,883	6,414

Births exceeded deaths by 546,850 in Madras Presidency; 545,183 in U. P.; 502,702 in Bengal; 485,299 in Punjab; 358,529 in B. & O.; 249,470 in Bombay Presidency; 164,056 in C. P.; 152,638 in Burma; 70,135 in Assam; 30,196 in N.-W. F. P.; 9,551 in Delhi; 5,023 in Ajmer-Merwara; and 411 in Coorg. As usual the birth rate exceeded the death rate in every province, the largest differences being recorded in the Punjab (+ 20 p. m.), Delhi (+14), N.-W. F. P. (+12), Burma (+12), Bombay (+11) and Madras (+11).

Deaths.

4. *British India.*—Registered deaths totalled 6,578,711 which was a decrease by 4% as compared with 1934 although the figure was still 3% in excess of the quinquennial mean of 6,371,449. The crude death rate was 23·6 p. m. a figure 1·3 p. m. lower than that in 1934 and also lower than the quinquennial mean. Rates for previous years were 24·9 p. m. in 1934, 22·4 p. m. in 1933, 21·6 p. m. in 1932, 24·9 p. m. in 1931, 26 p. m. in 1926—30 (average) and 27·5 p.m. in 1921—25 (average). As registration of deaths is carried out much more accurately than in the case of births, these figures indicate that the year under report was relatively healthy. This was particularly the case in the Punjab and C. P. In Assam, on the other hand, the death rate rose by 2 p. m. owing to greater prevalence of " fevers ". Female exceeded male mortality by 7 p. m. in Delhi, 1 p. m. in Bombay Presidency, 1 p. m. in Assam and 2 p. m. in Coorg. Table I (*viii*) gives registered deaths and the rates *per mille* according to sex for British India and for the various provinces.

TABLE I (*viii*).

	Deaths.			Death rate p. m.		
	M.	F.	Total.	M.	F.	Total.
British India .	**3,433,297**	**3,145,414**	**6,578,711**	**23·9**	**23·3**	**23·6**
N.-W. F. P. . .	25,536	20,260	45,796	19	18	19
Punjab . .	310,665	273,174	583,839	23	24	23
Delhi . . .	9,960	9,350	19,310	26	33	29
U. P. . . .	638,396	561,257	1,199,653	24	23	24
B. & O. . .	491,978	455,073	947,051	25	23	24
Bengal . .	589,225	542,202	1,131,427	22	22	22
C. P. . . .	278,400	254,348	532,748	33	31	33
Bombay . .	288,120	269,399	557,519	24	25	24
Madras . .	571,842	552,494	1,124,336	24	23	24
Coorg . . .	2,014	1,754	3,768	22	24	23
Assam . .	88,054	81,669	169,723	20	21	21
Burma . .	130,446	116,689	247,135	20	19	20
Ajmer-Merwara .	8,661	7,745	16,406	28	28	28

Both rural (23·6 p. m.) and urban (23·7 p. m.) death rates were lower than in 1934 and lower than quinquennial means. Urban death rates exceeded those for rural areas in the U. P. (+8 p. m.), Bombay (+2 p. m.), Coorg (+30 p. m.), Burma (+12 p. m.) and Ajmer-Merwara (+11 p. m.).

Rural death rates exceeded the urban in N.-W. F. P. (+1 p. m.), Punjab (+4 p. m.), Delhi (+5 p. m.), B. & O. (+9 p. m.), Bengal (+1 p. m.), C. P. (+2 p.m.), Madras (+8 p.m.) and Assam (+2 p.m.) Tables G and H on pages 216 and 217 give the recorded deaths and rates p. m. for rural and urban areas.

The seasonal incidence of mortality is subject to great fluctuations owing to periodic epidemics. The curve for 1935 showed two distinct peaks, one in May and the other in September. Registered deaths by months are given in Appendix I, Table E on page 215.

Death rates for the age-period 15—40 years were as usual higher among females than among males. Table I (*ix*) gives details. The subject of maternal mortality has been dealt with in Section III on page 67.

TABLE I (*ix*).

	Deaths, 15—40 years.		Death rates, 15—40 years.	
	Male.	Female.	Male.	Female.
British India	**573,015**	**634,105**	**10**	**11**
N.-W. F. P.	5,283	5,213	10	11
Punjab	49,506	50,247	9	11
Delhi	1,863	2,113	10	17
U. P.	98,931	104,898	9	11
B. and O.	104,041	104,361	13	13
Bengal	130,882	153,160	12	14
C. P.	Not available.		Not available.	
Bombay	43,842	49,784	11	11
Madras	92,851	114,985	10	11
Coorg	679	609	15	18
Assam	17,521	21,820	11	14
Burma	26,401	25,550	10	10
Ajmer-Merwara	1,215	1,365	9	12

Infantile mortality.

5. The downward trend in the infantile mortality rate which was the subject of comment in the 1930 report seems still to be in existence in spite of the higher rates registered last year. In contradistinction to the previous year, 1935 was comparatively healthy for the infant population and the recorded death rate of 164 p. m. of live births was the lowest on record. Reduced incidences of plague, malaria, fevers and respiratory diseases may be partly responsible for the large decrease of 12% as compared with 1934, but, on the other hand, smallpox was more widely prevalent and to that infection unvaccinated infants are always peculiarly susceptible. In any case, whatever the reasons for the decreased mortality, these seem to have influenced conditions all over India, as every province recorded a lower infant mortality than in the previous year. The largest decreases occurred in Delhi (—35 p. m.), Burma (—33 p. m.), Punjab (—32 p. m.), Bengal (—30 p. m.), C. P. (—29 p. m.), U. P. (—28 p. m.), Ajmer-Merwara (—27 p. m.) and B. & O. (—21 p. m.).

Although it is satisfactory to be able to record considerable reductions in the provinces, it must not be forgotten that the infant death rates recorded in India are still pitifully high. Previous reports have discussed at length the different causal factors and their influence on infant mortality and have also indicated the measures needed to remove these causes. These remarks are equally applicable today and it is not proposed to reiterate them. The present position of the maternity and child welfare organisations which is discussed in Section III gives a clear conception of what remains to be done before the infant mortality rates of India can be reduced to reasonably satisfactory dimensions.

TABLE I (*x*).

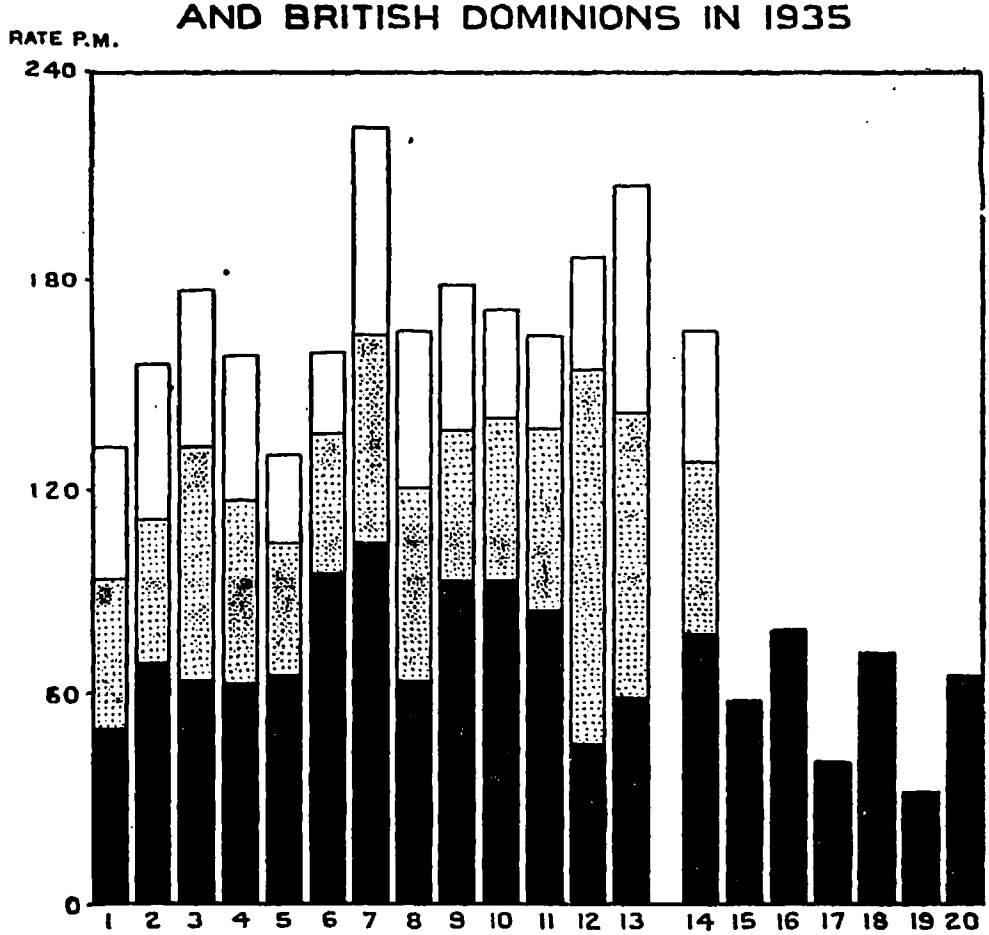
	Under one month.		One to six months.		6—12 months.		Total deaths under one year.	Death rate per 1,000 live births.	
	Number.	% of total.	Number.	% of total.	Number.	% of total.		1935.	1934.
British India	**741,372**	**47**	**488,544**	**30**	**358,286**	**23**	**1,588,202**	**164**	**187**
N.-W. F. P.	3,787	38	3,312	33	2,943	29	10,042	132	134
Punjab	73,159	44	47,413	29	45,345	27	165,917	155	187
Delhi	1,840	36	1,985	39	1,291	25	5,116	177	212
U. P.	108,865	40	96,416	35	69,008	25	274,289	157	185
B. & O.	84,103	50	52,567	31	32,018	19	168,688	129	150
Bengal	153,640	59	67,529	26	37,867	15	259,036	159	189
C. P.	72,416	46	41,226	26	42,124	27	155,766	224	253
Bombay	50,634	38	45,800	35	35,810	27	132,244	164	167
Madras	153,361	51	74,300	25	70,735	34	298,396	179	193
Coorg	385	54	196	27	134	19	715	171	189
Assam	19,799	50	12,813	33	6,543	17	39,155	163	165
Burma	18,135	24	43,210	58	13,080	18	74,375	186	219
Ajmer-Merwara	1,248	28	1,777	40	1,438	32	4,463	208	235

The main feature of Table I (*x*) which gives details for British India and for individual provinces is that the percentage mortality to total infant deaths has declined in the two age-groups 1—6 months and 6—12 months, whilst that for the group under one month has increased, particularly in the N.-W. F. P., C. P., Delhi, B. & O., Bengal, Burma and Ajmer-Merwara.

Table I (*xi*) gives details of the deaths of infants under one week. These comprised no less than 61% of the deaths under one month and 28% of the total. Both these percentages remain terribly high and no other argument is needed to stress the urgent necessity for expanding maternity relief and child welfare centres of every province both in urban and rural areas. The questions of ante-natal care and improved midwifery services are discussed at some

No 2

INFANTILE MORTALITY PER MILLE OF BIRTHS IN BRITISH INDIA, ENGLAND AND WALES AND BRITISH DOMINIONS IN 1935



INDEX.

Under one month.....

One to six months.....

Six to twelve months..

TOTAL INFANTILE MORTALITY RATES.

1 N.W.F.P.	6 Bengal.	11 Assam.	15 England & Wales.
2 Punjab.	7 C.P..	12 Burma.	16 Scotland.
3 Delhi.	8 Bombay.	13 Ajmer-Merwara.	17 Australia.
4 U.P.	9 Madras.	14 British India.	18 Canada.
5 B.& O.	10 Coorg.		19 New Zealand.
			20 Union of S.A.(White)

length in Section III of this report, so that it is unnecessary here to repeat the arguments there set out in favour of a wide expansion of the necessary preventive services. It is certain that little permanent reduction in maternal and infant mortality rates can be expected until every town and district has a properly equipped and properly staffed centre and a number of maternity beds at least for difficult or abnormal obstetric cases.

TABLE I (*xi*).

	Deaths under one week.	Rate p. m. live-births.	Percentage of: Deaths under one month.	Percentage of: Total infant deaths.
British India*.	**406,362**	**45**	**61**	**28**
N.-W. F. P.	1,918	25	51	19
Punjab	39,327	37	54	24
Delhi	709	25	39	14
U. P.	69,539	40	64	25
B. & O.	58,385	45	69	35
Bengal	86,268	53	56	33
C. P.		Not available.		
Bombay	22,493	28	44	17
Madras	106,586	64	69	36
Coorg	230	55	62	32
Assam	10,057	42	51	25
Burma	10,139	25	56	14
Ajmer-Merwara	711	33	57	16

*Excluding Central Provinces and Berar.

Table I (*xii*) gives figures of deaths among children up to 10 years of age along with death rates *per cent* of total deaths for British India and for the individual provinces. Of the 6,578,711 registered deaths, 43% occurred among children under 5 years of age. Whilst the percentage of deaths of infants under one year to total deaths has decreased somewhat, that of pre-school children in the 1—5 years group increased, particularly in the U. P. and Delhi.

TABLE I (*xii*).

	Under one year.	% of total deaths.	1—5 years.	% of total deaths.	5—10 years.	% of total deaths.	Total under 10 years.	% of total deaths
British India	**1,588,202**	**24**	**1,259,897**	**19**	**372,555**	**6**	**3,220,654**	**49**
N.-W. F. P.	10,042	22	8,097	18	2,683	6	20,822	46
Punjab	165,917	28	105,740	18	32,369	6	304,026	52
Delhi	5,116	26	4,183	22	985	5	10,284	53
U. P.	274,289	23	306,150	25	60,514	5	640,953	53
B. and O.	168,688	18	201,161	21	63,246	7	433,095	46
Bengal	259,036	23	157,022	14	81,685	7	497,748	44
C. P.	155,766	29	117,489	22	26,410	5	299,665	56
Bombay	132,244	24	122,665	22	27,649	5	282,558	51
Madras	298,396	27	174,419	15	52,648	5	525,463	47
Coorg	715	19	383	10	206	5	1,304	34
Assam	39,155	23	29,687	17	12,759	8	81,601	48
Burma	74,375	30	28,792	12	10,734	4	113,901	46
Ajmer-Merwara	4,463	27	4,109	25	667	4	9,239	56

Of the total infant deaths, 862,120 were male and 726,082 female. Provincial details are given in Table I (*xiii*).

TABLE I (*xiii*).

	Deaths.		Rates p. m. live births.	
	Males.	Females.	Males.	Females.
British India . .	**862,120**	**726,082**	**171**	**156**
N.-W. F. P. . . .	5,884	4,158	137	126
Punjab	90,192	75,725	160	150
Delhi	2,690	2,426	181	174
U. P.	149,626	124,663	162	152
B. & O. . . .	91,962	76,726	137	121
Bengal	140,449	118,587	166	151
C. P.	84,299	71,467	236	210
Bombay . . .	71,423	60,821	170	157
Madras	161,475	136,921	189	168
Coorg	375	340	168	174
Assam	21,015	18,140	170	156
Burma	40,349	34,026	258	206
Ajmer-Merwara . .	2,381	2,082	207	209

Provincial rural and urban infantile death rates are given in Appendix I, Table N on page 224. Urban death rates were higher than rural in every province, except C. P., Coorg and Assam.

Table I (*xiv*), gives interesting figures for the chief causes of infantile mortality in Bombay city, which has a census population of 1,161,383. It has been reproduced from the Annual Report of the Health Officer.

TABLE I (*xiv*).

	1931.	1932.	1933.	1934.	1935.	Mean 1931—35.
All causes.	**7,401**	**6,298**	**8,320**	**8,253**	**8,455**	**7,745**
Smallpox	2	69	717	33	306	225
Measles	15	16	18	27	60	27
Malaria	5	4	9	9	9	7
Remittent and undefined fever .	198	147	167	186	146	169
Diarrhœa and enteritis . .	366	280	414	455	425	388
Dysentery	34	27	19	40	41	32
Debility, malformations and premature birth.	2,987	2,685	3,019	3,384	3,280	3,071
Respiratory diseases . . .	2,646	2,217	2,828	2,983	3,039	2,743
Convulsions	620	422	594	562	563	552
Other causes	528	431	535	574	586	531

Still-births.

6. Table I (*xv*) gives the registered still-births in British India and in different provinces.

TABLE I (*xv*).

	Male.	Female.	Total.	Rate p. m. live-births.
British India	**87,552**	**69,081**	**201,764**	**20·8**
N.-W. F. P.	109	61	170	2·2
Punjab	6,016	4,403	10,419	9·7
Delhi	200	180	380	13·2
U. P.	8,590	6,670	15,260	8·7
B. & O.	22,209	17,566	39,775	30·4
Bengal	40,209	32,349	72,558	44·4
C. P.	Not available.		15,950	22·9
Bombay	7,827	5,911	13,738	17·0
Madras	Not available.		20,312	12·0
Coorg	71	75	146	34·9
Assam	Not available.		8,748	36·5
Burma	2,321	1,866	4,187	10·5
Ajmer-Merwara	Not available.		121	5·6

Registration.

7. Sufficient has been said in previous reports in regard to the defects of the existing system of registration of births and deaths in India, but it seems desirable to make brief mention once more of the errors brought to notice and of the attempts made to obtain greater accuracy in these records in the different provinces. In N.-W. F. P., as many as 13,690 births or 18% of the total and 3,620 deaths or 8% of the total were discovered to be unregistered. In B. & O., registration is compulsory in the 58 municipalities, but, of the 18,505 births and deaths checked, 147 omissions were detected. In rural areas, where voluntary registration is practised, verification is possible only in those districts which employ M. O. Hs. In Bengal, registration is compulsory in all urban and rural areas under the Bengal Births and Deaths Registration Act, 1873. In rural areas, however the registration, collection and transmission of vital statistics continued to be carried out in unsatisfactory fashion. 7,200 unregistered births and 3,939 unregistered deaths were detected. A total of 2,200 births and 110 deaths were found to be unregistered in Bombay. Whilst registration is compulsory in all municipal towns in Madras, in rural areas it is compulsory only in those villages to which the Madras Registration of Births and Deaths Act, 1899, has been extended. So far this Act has been extended to about 35% of the villages, most of these having a population of over 2,000. District health staffs detected 38,036 births and 11,763 deaths which had not been registered in rural areas. Registration of vital statistics continued to be compulsory in 26 municipal towns of Assam but not in rural areas. Even in the former areas, 224 unregistered births and 54 deaths were discovered. In the Hill districts registration is only partially carried out. In Burma, registration was in force in 32,559 towns and villages. In the Arakan Hill Tracts, the

Shan States, the Chin Hills and Kachin Hill Tracts, the tally system by means of coloured sticks or notched bamboo splits has been in force since 1922.

Indian States.

8. Only a few Indian States submit vital statistics; summaries of these are given in Table I (*xvi*).

TABLE I (*xvi*).

States.	Population.			Births.			Birth rate p. m.	Total deaths.	Death rate. p. m.
	M.	F.	Total.	M.	F.	Total.			
Jind	176,383	148,293	324,676	7,590	6,718	14,308	44	9,710	30
Suket	29,859	28,549	58,408	678	600	1,278	22	1,035	18
Kalsia	33,306	26,542	59,848	1,234	990	2,224	37	2,053	29
Maler Kotla	45,883	37,189	83,072	1,124	928	2,052	25	1,098	13
Baghat	5,744	3,981	9,725	50	53	103	11	110	11
Jawhar	29,502	27,759	57,261	1,139	1,104	2,243	39	1,478	26
Dhrol	13,614	14,039	27,653	715	637	1,352	49	595	21
Kolhapur	476,105	453,153	929,258	19,238	17,951	37,189	40	21,245	23
Mysore	3,415,114	3,254,006	6,669,120	70,209	66,150	136,359	20	96,974	15

Mysore State.—Birth rates in the districts varied between 25 p. m. in Shimoga and 17 p. m. in Kadur. Still-births numbered 2,110 or 15 p. m. of live-births. The birth rate in urban areas was 31 p. m. and in rural areas 19 p. m.; the death rates were 19 p. m. and 14 p. m., respectively. The male death rate was 14 p. m. and female 15 p. m. District death rates varied between 12 p. m. in Tumkur and 17 p. m. in Shimoga. The infantile death rate was 116 p. m of live births; urban 121 p. m. and rural 114 p. m.

Rainfall.

9. Taking the year as a whole, rainfall was in slight excess in the Bay Islands, east Rajputana and Berar, in slight defect in Bengal, Orissa, the U. P., Sind, the Konkan, Malabar and the north Madras coast and normal elsewhere. Averaged over the plains of India, the years' total rainfall was in defect by 4%.

During January and February, rainfall was in large excess in the Punjab, the N.-W. F. P., Baluchistan, Sind, Gujarat and South Hyderabad, in slight to moderate excess in Chota Nagpur, Bihar, the U. P., Kashmir, Rajputana, East Central India, North Hyderabad and south-east Madras, normal in Assam, Bengal, Mysore and Malabar, in slight to moderate defect in Upper Burma, west Central India, the C. P. (including Berar) and the Bombay Deccan and in large defect elsewhere.

The total rainfall of the hot weather period, March to May, was in large excess in the Bay Islands; in slight to moderate excess in the east and north Punjab, the N.-W. F. P., and Sind; normal in the southeast Punjab, Kashmir, Berar and Hyderabad; in slight to moderate defect in Burma, Assam, Bengal, Orissa, the west U. P., Baluchistan, Rajputana, the C. P. (outside Berar), Mysore, Malabar, southeast Madras and the Madras Deccan; and in large defect elsewhere.

During the monsoon season, June to September, it was in slight excess in Assam, east Rajputana, Berar, the western C. P., north Hyderabad and the Madras Deccan; in slight to moderate defect in the west U. P., the Punjab, Kashmir, the N.-W. F. P., Sind and Malabar; and in large defect in Baluchistan; it was normal over the rest of the country.

During the retreating southwest monsoon period, October to December, the rainfall was in large defect in north-east India (including Orissa), the

east U. P., Baluchistan, Sind, Gujarat, east Central India and the C. P. (including Berar); in slight to moderate defect in the west U. P., the Punjab, the N.-W. F. P., west Rajputana, the Konkan, South Hyderabad, the Madras, Deccan and north Madras coast; normal in the Bay Islands, southeast Madras, Mysore, north Hyderabad, west Central India and Kashmir and in slight to moderate excess elsewhere.

Table I (*xvii*) gives the figures of actual rainfall, compared with the normal in the various provinces in each quarter of 1935.

TABLE I (*xvii*).

Rainfall in inches.

	January and February.		March to May.		June to September.		October to December.		Total.	Departure from normal.
	Actual.	Normal.	Actual.	Normal.	Actual.	Normal.	Actual.	Normal.		
Mean of India .	**1·2**	**1·0**	**3·6**	**5·1**	**36·5**	**36·7**	**4·5**	**5·0**	**45·8**	**—2·0**
N.-W. F. P. .	4·1	2·5	4·8	4·2	6·8	7·9	0·9	1·2	16·6	+0·8
Punjab . .	3·7	1·9	2·3	2·0	13·2	15·3	0·7	0·8	19·9	—0·1
U. P. . .	2·0	1·5	0·6	1·3	30·0	33·5	0·9	1·8	33·5	—4·6
B. & O. .	1·6	1·5	1·6	4·0	43·3	42·6	0·2	3·8	46·7	—5·2
Bengal . .	1·2	1·3	7·7	12·8	50·9	54·9	0·7	5·9	60·5	—14·4
C. P. . .	0·9	1·8	1·1	1·6	44·1	40·5	0·6	2·8	46·7	+0·4
Bombay . .	0·2	0·2	0·4	0·6	36·4	39·6	3·4	3·4	40·4	—4·4
Madras . .	1·1	1·2	3·7	6·0	26·4	29·0	15·3	15·8	46·6	—5·4
Assam . .	2·2	2·2	20·2	25·2	77·1	66·6	2·5	7·0	102·0	+0·9
Burma . .	0·1	0·3	7·7	10·5	63·3	66·2	12·9	9·2	84·0	+1·7
Sind . .	1·1	0·5	0·7	0·5	4·0	5·7	...	0·2	5·8	—1·1
Rajputana .	0·8	0·6	0·6	0·9	20·5	19·1	0·8	0·9	22·7	+1·5
Central India .	0·7	0·8	0·3	0·9	32·6	33·1	1·2	1·6	34·8	—1·6
Hyderabad .	0·8	0·5	2·0	2·0	27·6	26·5	3·2	3·7	33·6	+0·9
Mysore .	0·3	0·3	4·4	5·4	22·8	22·4	8·2	8·2	35·7	—0·5

Agricultural and economic conditions.

10. Table I (*xviii*) gives the cultivated and uncultivated acreage in British India and different provinces during the years 1934-35 and 1935-36.

TABLE I (*xviii*).

Area cultivated and uncultivated in each province.

		Cultivated.		Uncultivated.	
		Net area actually sown.	Current fallows.	Culturable waste other than fallow.	Not available for cultivation.
British India	1935-36	**228,713,412**	**51,399,765**	**153,064,332**	**145,985,690**
	1934-35	226,962,527	52,298,737	154,266,722	144,816,630
N.-W. F. P. .	1935-36	**2,315,034**	**457,246**	**2,785,161**	**2,666,205**
	1934-35	2,199,328	578,502	2,741,432	2,693,548
Punjab .	1935-36	**27,462,134**	**3,606,988**	**14,232,802**	**12,897,757**
	1934-35	26,504,016	4,619,933	14,215,656	12,862,386
Delhi .	1935-36	**212,751**	**13,451**	**61,971**	**80,321**
	1934-35	204,696	23,098	60,522	80,214
U. P. .	1935-36	**35,906,808**	**2,756,405**	**10,157,054**	**9,868,845**
	1934-35	35,662,051	2,910,102	10,217,742	9,900,572

		Cultivated.		Uncultivated.	
		Net area actually sown.	Current fallows.	Culturable waste other than fallow.	Not available for cultivation.
B. & O.	1935-36	25,642,142	8,649,193	7,927,104	11,883,192
	1934-35	24,131,800	6,931,605	6,982,180	8,034,792
Bengal	1935-36	22,674,000	5,670,428	6,657,916	9,794,341
	1934-35	23,357,000	5,424,285	6,626,134	9,229,308
C. P.	1935-36	24,301,398	3,958,846	14,052,250	4,914,828
	1934-35	24,668,067	3,988,965	14,209,929	4,949,650
Bombay	1935-36	33,325,994	10,340,495	6,857,693	19,140,920
	1934-35	32,801,971	10,717,834	6,665,962	19,477,464
Madras	1935-36	31,838,922	10,243,865	11,493,106	16,926,256
	1934-35	32,800,795	11,165,710	13,442,650	19,792,886
Coorg	1935-36	140,027	169,313	11,690	334,045
	1934-35	137,421	171,919	11,690	334,045
Assam	1935-36	6,366,992	1,494,457	18,899,650	4,577,400
	1934-35	5,971,697	1,823,513	19,136,779	4,571,030
Burma.	1935-36	18,161,175	3,874,311	59,625,342	52,060,236
	1934-35	18,164,499	3,799,494	59,679,265	51,996,340
Ajmer-Merwara.	1935-36	366,035	164,767	302,593	840,744
	1934-35	359,186	143,777	276,781	894,395

Table I (*xix*) gives the areas in acres under food crops in the major provinces. Figures for minor administrations are not available.

TABLE I (*xix*).

Total	193,851,299
N.-W. F. P.	2,262,815
Punjab	21,945,083
U. P.	37,258,528
B. & O.	23,595,300
Bengal	22,905,700
C. P.	19,396,035
Bombay	20,360,000
Madras	26,762,872
Assam	5,529,737
Burma	13,835,229

Additional information extracted from provincial season and crop reports for 1935-36 is included in the following sub-paragraphs.

N.-W. F. P.—The sown area aggregated 2,711,740 acres or 5% more than in 1934-35 and nearly 3% above normal; that, harvested amounted to 2,242,811 acres which was 5 % more than in 1934-35 and 6% above normal; the balance of 468,929 acres or 17% of the sown area failed to mature. The total estimated produce of rice was 17,982 tons or 5% above normal; *juar*

11,706 tons, 11% below normal; maize 187,656 tons, 16% below normal; sugar cane 64,781 tons or 35% above normal. Prices were low. Stocks of food grains and fodder were generally sufficient.

Punjab.—Of the total area of 31,850,814 acres sown, which was 7% more than in 1934 and 3% more than the decennial mean, 26,666,766 acres or 84% were cropped, and included 21,945,083 acres under cereals and pulses—rice 971,981 acres, wheat 9,300,139, barley 665,921, *juar* 821,086, *bajra* 3,018,423, maize 1,091,291, gram 4,707,909 and other crops 1,368,333 acres. The remaining 5,184,048 acres or 16% failed to mature. The total outturns were rice 464,900 tons, 5% above normal; wheat 3,052,000 tons, 3% above normal; barley 175,000 or 19% below normal; *juar* 89,000 or 10% below normal; *bajra* 390,000 or 13% above normal; maize 382,000 or 4% above normal and gram 954,000 tons or 9% less than normal. Prices generally ruled higher than in 1934 but were lower than normal.

U. P.—Of a total area of 60,553,533 acres, 35,278,077 acres were actually cultivated, the remaining 2,860,152 acres being under forests, 2,732,405 acres current fallows, 9,623,845 acres not available for cultivation and 10,059,054 acres culturable waste. Food crops occupied 37,258,528 acres, including areas cropped more than once. The principal food crops were rice 6,626,097 acres, wheat 7,052,683 acres, barley 3,784,435 acres, *juar* 2,236,877 acres, gram 5,679,540 acres, maize 2,120,410 acres and *kodon* 1,287,842 acres. The total outturn of wheat was 2,498,000 tons, *jūar* 449,000 tons, *bajra* 457,000 tons, maize 808,000 tons, and gram 1,718,000 tons.

B. & O.—Of a total area of 53,134,598 acres, an aggregate of 23,180,700 acres, excluding 4,894,800 acres sown more than once, was cultivated. In other words the total cultivated area was 28,075,500 acres. The remaining 29,953,898 acres were either under forests, or were current fallows, culturable waste or were not available for cultivation. Food grains and pulses occupied 23,595,300 acres and oil-seeds 1,613,700 acres. Compared with the previous year, the area under winter rice which was 10,015,800 acres diminished by nearly 3% and that under autumn rice, 3,135,200 acres, by 7%. The estimated gross outturn of rice was 3,404,700 tons, of wheat 416,300 tons, barley 367,600, Indian corn 506,800, gram 383,300, jute 355,700 and sugar cane 667,900.

The prices of staple food grains ruled a little higher. Trade depression and economic distress continued to operate adversely. The emigration of labourers from Balasore and Puri to Calcutta, Jamshedpur and Rangoon continued.

Bengal.—Of a total of 49,254,596 acres, 22,674,000 acres or 46% were actually cultivated, but 5,021,300 acres were cropped more than once. Of the combined total of 27,695,300 acres, food crops occupied 22,905,700 acres or about 83%, fibres 1,770,800 acres, oil-seeds 1,016,300 acres, 510,600 acres under drugs and narcotics, including 2,600 acres under cinchona, 380,400 under sugar and 1,111,500 acres under other crops. About 7% of the total net cultivated area was irrigated.

The winter rice crop was 68% of the normal as against 85% in 1934-35; autumn rice 72% and 75% and gram 81% and 62%. Owing to an unsatisfactory harvest, prices of staple food-grains and of jute ruled generally a little higher than in 1934-35. Wages of agricultural labourers were generally the same.

Central Provinces and Berar.—The total area was 37,986,368 acres in the C. P. proper and 11,378,001 acres in Berar. In the C. P. 23,551,097 acres

and in Berar 8,324,020 acres were cultivated, but the area actually under crops was only 17,711,735 acres in the C. P. proper and 6,589,663 acres in Berar, the remaining acreages failing to yield crops for various reasons. Persistent and excessive rainfall during the early monsoon period proved unfavourable to *kharif* crops except rice, while the abrupt cessation of the monsoon after the last week of September and inadequate winter showers combined with frost, hail and cloudy weather in the last month of 1935 and the first two months of 1936 reduced the *rabi* outturn. Of the autumn crops, rice yielded an outturn of 1,467,800 tons or 88% of the normal, cotton 652,571 bales or 62%, *juar* 69% of the normal, *tur* 73% and *kodon kutki* 77%, whilst of the spring crops wheat yielded an outturn of 641,000 tons or 78% of the normal, gram 80% of the normal and linseed 73%.

The total estimated value of crops, which were 73% of the normal, fell by $3\frac{3}{4}$ crores of rupees as compared with the previous year, the fall being mainly due to unfavourable conditions for cotton, the principal commercial crop.

Bombay Presidency.—In the Presidency proper, gross and net cropped areas increased from 29,039,000 and 28,147,000 acres respectively in 1934-35 to 29,373,000 and 28,540,000 acres during 1935-36. The most noticeable increases occurred in the Deccan and Karnatak divisions, these reflecting the favourable nature of the sowing rains. The area under food crops (20,360,000 acres), such as cereals, pulses, sugarcane, fruits and vegetables decreased by 304,000 acres, or 1·5%, below the figure for the previous year, but these showed an expansion of 638,000 acres or 3·2% as compared with the average. The area under non-food crops, comprising cotton, tobacco and oil seeds, increased by 638,000 acres or 7·6% as compared with 1934-35 and by 455,000 acres or 5·3% as compared with the average. Estimated yields of the principal food crops were rice 842,544 tons; wheat 314,332 tons; *jowari* 1,573,478 tons; *bajri* 536,577 tons; *ragi* 224,004 tons; other cereals 296,093 tons; and pulses 528,246 tons. Little improvement occurred in the prices of agricultural produce except in the case of rice, wheat and groundnut and the slump conditions of 1930-31 continued to prevail.

Madras Presidency.—Of a total area of 83,591,038 acres, only 31,839,022 or 38% acres were cultivated, but including the area cropped more than once the total was 36,628,827 acres. Food crops included cereals 23,827,282 acres and pulses 2,935,590 acres or over 77% of the total. The important rice crop occupied 13,109,418 acres, which was 10% below normal; other important food crops included *cholam* 9,732,056 acres,6% above normal; *cumbu* 5,094,830 acres; *ragi* 2,660,702 acres; *korra* 1,552,397 acres; and *veragu* 1,050,636 acres. Total Presidency yields were paddy 7,283,840 tons, *cholam* 1,369,730 tons, *cumbu* 715,570 tons, *ragi* 833,860 tons, *korra* 303,640 tons and *veragu* 364,210 tons. Stocks of foodgrains and fodder were generally sufficient. Prices continued to rise.

Assam.—The area sown aggregated 6,366,992 acres; this included 5,529,737 acres or 87% under food crops; 391,621 acres under oilseeds; 447,487 acres under drugs and narcotics and the remainder under sugar, fibres, fodder crops, fruit and vegetables. Yields of the principal crops were rice 1,610,100 tons, jute 312,600 bales, tea 101,100 tons, rape and mustard 45,400 tons and sugarcane 39,300 tons. Wholesale prices were on the whole higher than in 1934-35.

Burma.—The total provincial acreage of 96,279,056 acres comprised 19,877,801 acres under forests, 19,287,985 acres " culturable waste other than fallow ", 3,874,311 acres fallow, whilst 17,142,175 acres were actually cultivated and 36,096,784 acres were not available for cultivation. The area sown more than once aggregated 1,188,211 acres. Of the total cultivated

area 13,835,229 acres were under cereals and pulses including 11,874,455 acres under rice and 1,010,551 acres under fruit and vegetables. The total harvests yield per acre was 93% of the normal and 83% of that of the previous year. Prices fluctuated. Deterioration of soil in parts of Pegu, Henzada, Kyaukse and Myingyan districts was reported.

Famine conditions and their relief.

11. On relief measures in the famine stricken parts of Anantapur and Bellary districts of Madras Presidency Government expended Rs. 17,23,452 and the I. P. F. Trust Rs. 25,000. Seasonal conditions were unfavourable in parts of Ganjam district and partial failure of crops owing to inadequate rainfall occurred in Guntur district. Owing to the partial failure of the monsoon in 1934 and renewed failure in 1935 in Murshidabad, Bankura and Birbhum, the rice harvest in the uplands of five districts, was barely 25% of the normal and over a considerable area it failed entirely. In Burdwan and Hooghly further havoc was caused by two floods in 1935. The first flood caused much damage to life and property but came at a time when it was possible to replace the damaged crop by fresh transplantations. A second flood followed carrying away this crop as well and a later drought made cultivation of the *rabi* crops impossible. To relieve distress due to drought in 1934, test works were opened in Murshidabad, Birbhum and Bankura in October, 1934, and were continued till June, August and November, 1935. Agricultural loans and land improvement loans were also freely given. Test works were opened or reopened on a much larger scale in Bankura, Birbhum, Burdwan, Hooghly and Murshidabad in January, 1936, and subsequently in Khulna and 24-Parganas. Expenditure on relief operations in 1935-36 included Government agricultural and land improvement loans Rs. 9,26,927; Government test relief Rs. 2,36,578; Government of Bengal gratuitous relief Rs. 22,762; and I. P. F. Trust Fund gratuitous relief Rs. 24,500.

Some damage by frost was caused to crops in Janaury, 1935, in parts of C. P., Delhi, Ajmer-Merwara, U. P., Punjab, Bombay and Sind and to fruit trees in Baluchistan. Where necessary, Local Governments granted remissions and suspensions of revenue. During 1935-36 crops were destroyed by floods or excessive rain in parts of Bihar and Orissa, Assam, N.-W. F. P., Western India States, Bengal, Punjab, Central India and Eastern States, Bombay, U. P., and Burma. In 1935 special grants aggregating Rs. 30,000, Rs. 25,000 and Rs. 50,000, respectively, were distributed for relief of distress in Bengal, Madras and Baluchistan. For Baluchistan the grant was given to relieve earthquake refugees in Quetta.

SECTION II.

HISTORY OF CHIEF DISEASES.

Chief causes of mortality.

12. The methods of registration practised in India make it difficult to assess with any degree of accuracy the state of the public health. Sickness statistics are of course unobtainable even for industrial communities, so that recorded mortality figures, admittedly defective, must be used in order to reach such conclusions as the epidemiologist may be bold enough to make. In these circumstances it is ordinarily unsafe to make definite inferences from the statistics of any one year although, on the assumption that the percentage of error is fairly constant, statistics over a period of years may reasonably be expected to give not unduly distorted epidemiological pictures.

Owing to the lesser prevalence of plague, malaria and "fevers", 1935 was a moderately healthy year especially in N.-W. F. P., Punjab, U. P., B. & O., Bengal and C. P. The general death rate fell from 24·9 to 23·6 p. m. In view of the widespread epidemics of cholera, especially in Madras Presidency, Assam and Burma, as well as in B. & O. and Bengal, this reduction in mortality gives cause for some satisfaction. Except in regard to plague, the incidence of which fell by 80% as compared with the previous year, the mortality under other recorded headings was much the same as in 1934.

"Fevers" with a death rate of 14 p. m. continued to be the chief recorded cause of mortality; "other causes" gave a death rate of 6 p. m.; respiratory diseases 2 p. m.; dysentery and diarrhoea 1 p.m., whilst for the three major epidemic diseases taken together the death rate was just 1 p. m.

It becomes more and more clear that some attempt should be made to analyse the large numbers of deaths recorded under "other fevers", respiratory diseases and "other causes". Even a partial exposition of these omnibus groups would almost certainly reveal problems demanding urgent attention. Such analyses would, for example, give public health departments much needed information as to the real incidence of pulmonary tuberculosis and would indicate whether the tuberculosis problem presented different aspects among the rural and the urban populations of this country. It is just because the health officer cannot obtain such epidemiological facts that he is so severely handicapped in his efforts to apply preventive methods. A few spasmodic and local efforts have been made during recent years to improve registration and to verify the causes of death, but until more general effort in those directions is practised, the epidemiologist using existing statistics will be accused with some degree of truth of mere speculation.

Cholera.

(a) General.

13. The rise in the mortality curve evidenced during 1933 and 1934 continued during 1935, but the peak did not approach those commonly in evidence prior to 1921. It is worth noting, too, that the rise in the wave seems to have been arrested during the first half of 1936.

Recorded deaths in British India totalled 217,162, an increase of 18,000 over the figure for 1934 and about 7,000 over the decennial mean. These figures give a death rate of 0·8 p. m. as against 0·7 p.m. in 1934 and 0·8 p.m.

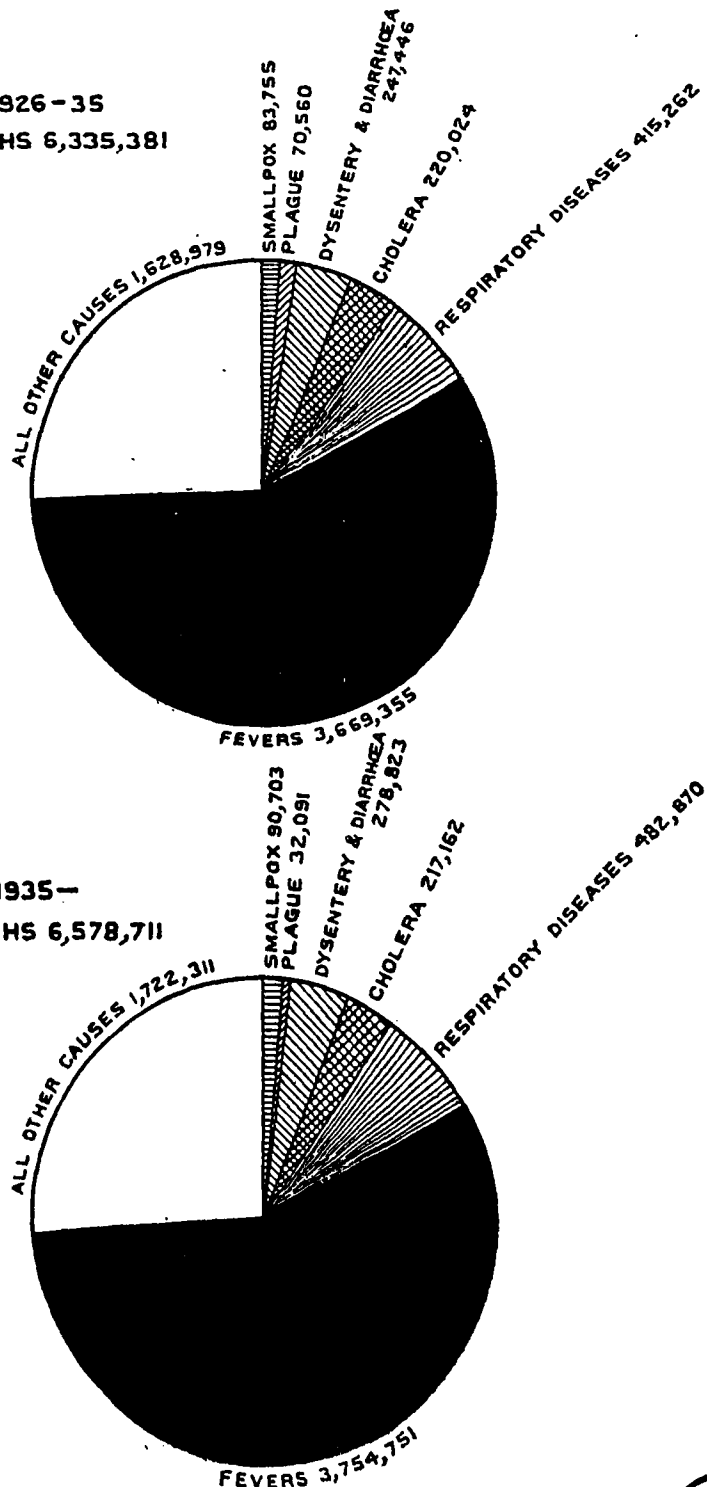
Abbreviations:—

N.-W. F. P.	North-West Frontier Province.
U. P.	United Provinces of Agra and Oudh.
B. and O.	Bihar and Orissa.
C. P.	Central Provinces.
P. M.	*Per mille.*

№ 3

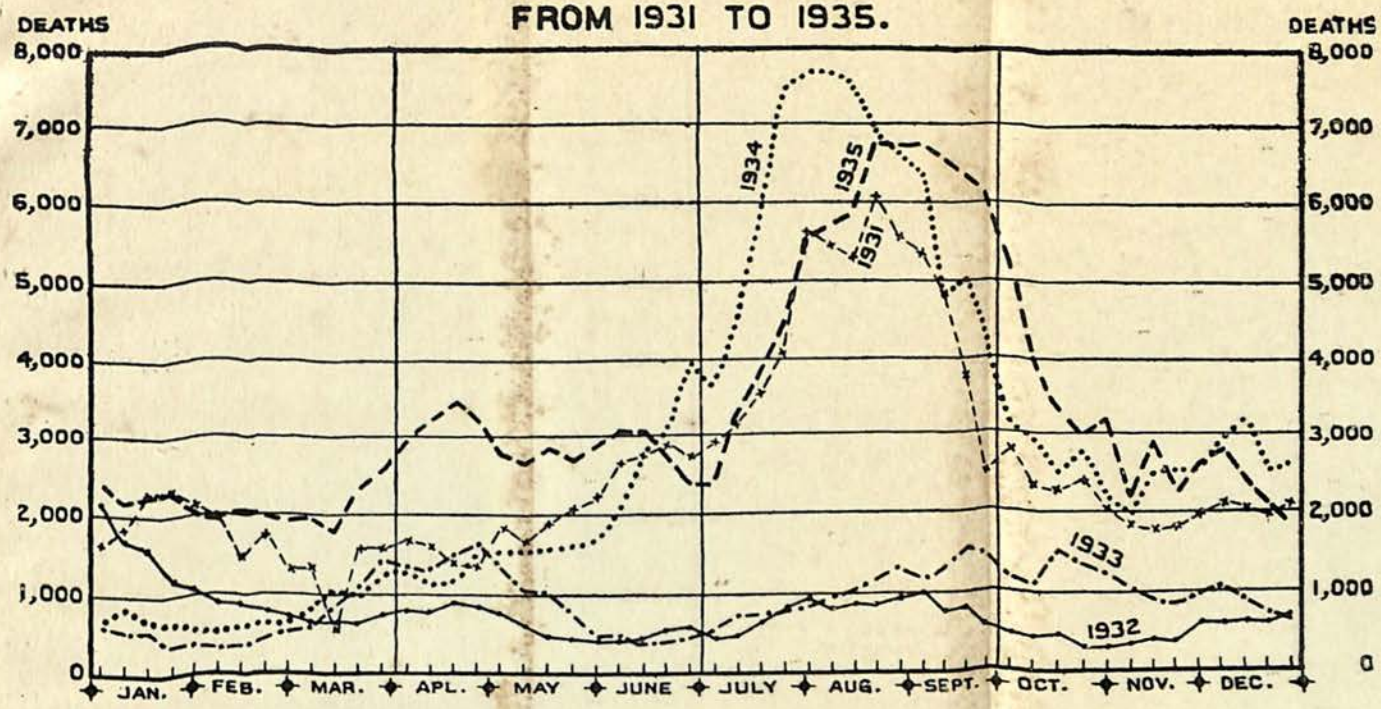
BRITISH INDIA

COMPARATIVE DIAGRAMS OF DEATHS BY CAUSES



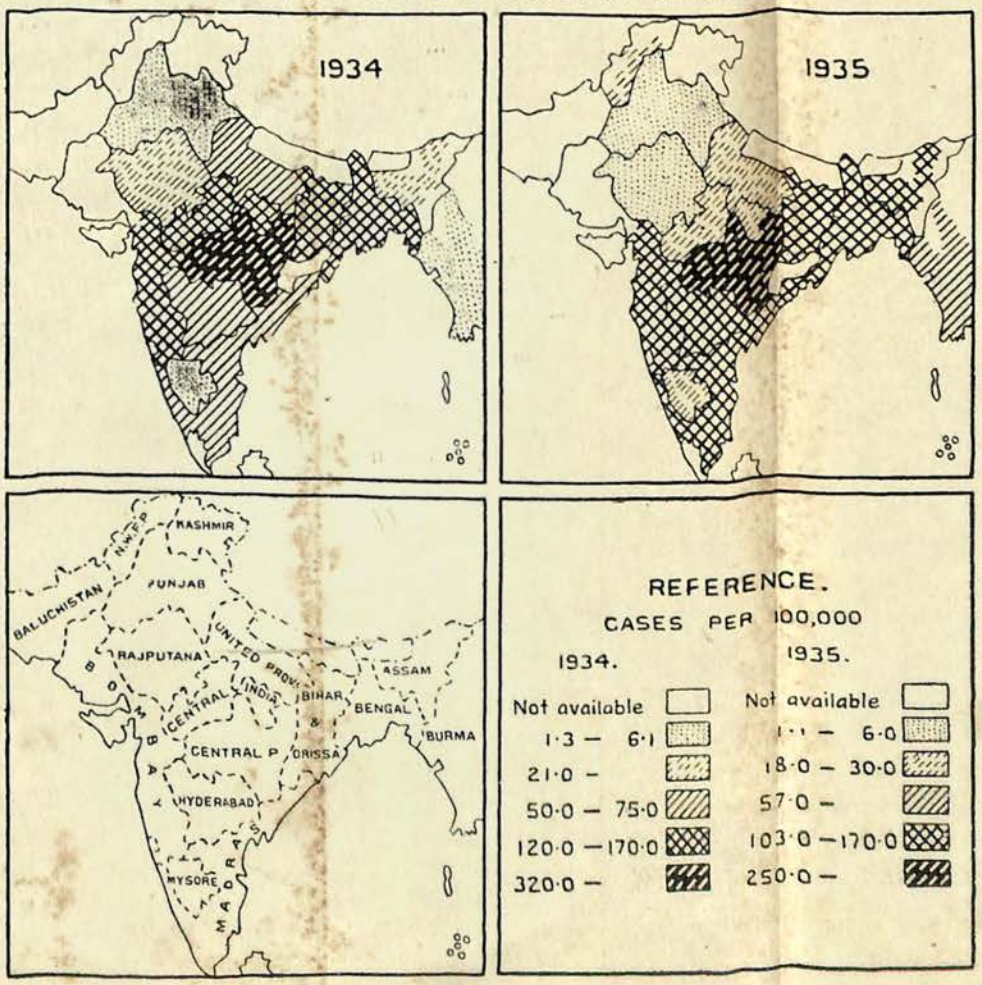
№ 4

WEEKLY NUMBER OF DEATHS FROM CHOLERA IN INDIA FROM 1931 TO 1935.

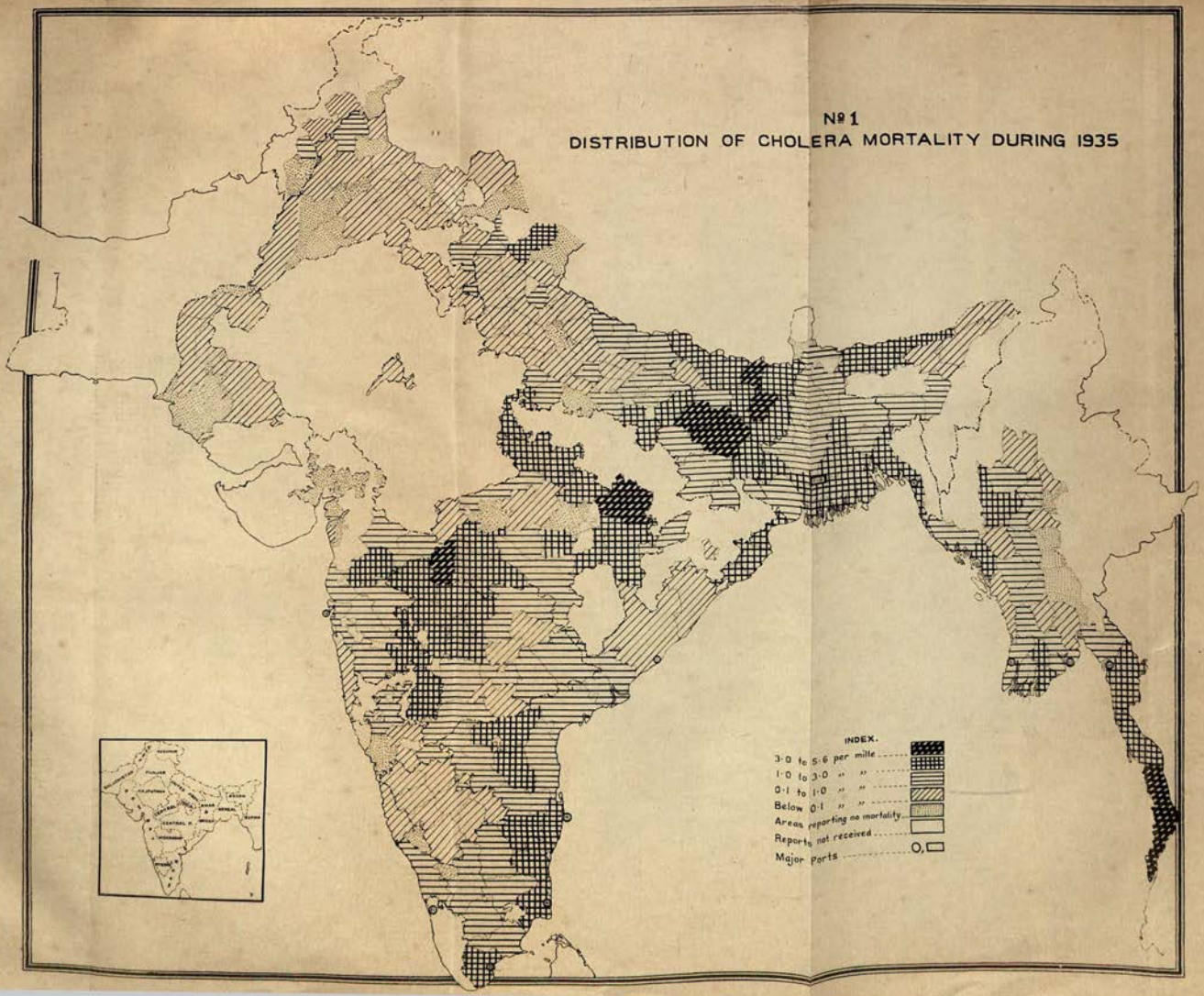


CHANGES IN THE GEOGRAPHICAL DISTRIBUTION OF CHOLERA IN INDIA DURING 1934 & 1935

(CASES REPORTED PER 100,000 INHABITANTS IN EACH PROVINCE.)



NOTE.- Based on data published in the League's Epidemiological reports for the year 1936.


№1
DISTRIBUTION OF CHOLERA MORTALITY DURING 1935
INDEX.
3·0 to 5·6 per mille
1·0 to 3·0 " "
0·1 to 1·0 " "
Below 0·1 " "
Areas reporting no mortality
Reports not received
Major ports

the decennial mean. Every province except the U. P. and the C. P. recorded increased mortality. In the former, the epidemic was localised and quickly suppressed; in the latter, Chattisgarh division with its unsatisfactory water supplies was the chief focus of infection. In the C. P., Punjab, N.-W. F. P. and Madras Presidency infection imported from fairs and festivals was responsible for sharp outbreaks; in Assam and in several other areas belated reporting of outbreaks permitted undue spread of the disease. It should be clearly understood that until district boards and municipal councils provide themselves with qualified health officers and adequate health staffs and those bodies are prepared to spend money on efficient water supplies and sanitation, any campaign devised against cholera will almost inevitably prove abortive. Methods for the prevention of cholera are no longer a matter of doubt. The application of these methods lies entirely in the hands of local authorities; but until those authorities adopt the necessary methods, cholera will continue to be a scourge.

For the most part, rural areas suffered much more severely than urban, the respective death rates being 0·8 p. m. and 0·5 p. m., but Delhi, Madras and Bengal were exceptions to this rule. It may be said generally that the same causes were at work in both rural and urban areas although a number of municipal towns now possess protected water supplies and are to that extent insured against water-borne epidemics of cholera.

In British India, out of a total of 461,144 villages, 42,233 or 9% were infected. As regards individual provinces, 38% of all villages were infected, 35% in Delhi Province, 17% in Bengal, 15% in B. & O., 15% in Burma, 7% in C. P., 6% in Bombay, 5% each in the Punjab and Assam, 3% each in N.-W. F. P. and Ajmer-Merwara and 2% in the U. P.

The maximum number of deaths was recorded in September (30,068) and the minimum in February (10,848), but the peak months of course varied from province to province. The U. P., B. & O., Bengal, C. P., Bombay, Madras, Assam and Burma remained infected throughout the year.

The incidence of cholera at the various ports in India is shown in Map No .1.

(*b*) *Provincial.*

N. W. F. P.—In the settled areas, 3 districts recorded 478 cases with 245 deaths, or a case of mortality of 51%. The epidemic started in Bannu and Peshawar districts towards the end of August and subsided in October. Kohat district became infected in September but this outbreak was mild and quickly brought under control. Bannu district recorded 14 deaths; only one case occurred in Chitral. Infection in all three districts was imported through fairs attended by pilgrims from adjoining infected districts of the Punjab. In order to prevent importation of infection from Kashmir, Campbellpore and Hasan Abdal, three inspection posts were established in Hazara district.

Punjab.—Although 24 districts were infected, recorded cases and deaths numbered only 1,293 and 714, as against 279 and 178 in 1934. Attock, Lahore and Karnal districts contributed about half the total for the province; of the total, 354 deaths occurred in 29 towns and 360 in 158 villages. It is believed that the disease was imported from Hardwar and other parts of the U. P., from Delhi, Bengal and Bombay. Infection in rural areas was usually carried from towns. In this connection the D. P. H. remarks :—

" The defective system of conservancy in the towns with its consequent spread of fly-borne disease is mostly responsible for persistence of infection for longer periods and is a standing menace to the health of the rural population in constant communication with them. In spite of our most serious endeavours there is little prospect of controlling the spread of infection to the rural areas until the conservancy system in towns is put in order. "

Delhi Province.—There were 311 cases and 181 deaths as against 21 and 19 in 1934, the highest incidence being recorded in July. One hundred deaths were recorded in Delhi city, 37 in the notified area civil lines, 27 in New Delhi and 17 in rural areas.

U. P.—The death rate was only 25% of that for 1934, nor was the disease widespread for only 1,799 out of 105,640 villages were infected. In order to prevent importation of infection from Nepal State, the "barrier scheme" introduced last year was continued in Gorakhpur and Basti districts.

B. & O.—This province again suffered severely, the total number of deaths increasing to 64,876 with a death rate of 1·7 p. m.

The districts of Balasore, Cuttack and Puri reported sporadic infection from the beginning of the year; Muzaffarpur, Darbhanga, Purnea, North Bhagalpur and Manbhum districts reported deaths from the beginning of April and Champaran, Monghyr, Shahabad and Singhbhum were infected by early May. By July the disease had spread to nearly every district and it assumed a definitely epidemic character in August in Gaya, Santal Parganas and Hazaribagh. The epidemic reached its peak in August and thereafter declined slowly until by the middle of October the disease had practically subsided.

The D. P. H. summarises the epidemiological position thus :—

"A comparative study of mortality figures from cholera, district by district, from 1929 to 1935 further shows that cholera generally begins late in the summer in the districts of South Bihar and remains present till the advent of the winter months; but the disease begins early in the summer months in the districts of North Bihar and dies out by the end of the monsoon period, while it is found more or less present almost throughout the year in the districts of Orissa. A bad year generally recurs every five or six years and the highest intensity of the epidemics in the districts of South Bihar and in those of North Bihar occurs in two different but consecutive years. Cholera was widely prevalent in seven districts of South Bihar, Orissa and Chota Nagpur in 1930. The year 1934 proved again a bad cholera year for the same districts while the districts of North Bihar were comparatively worse affected in 1935."

Bengal.—A total of 59,605 deaths gave a death rate of 1 p. m.; these exceeded the figures for 1934 and the quinquennial mean by 20%. The seasonal curve of mortality fluctuated. The number of deaths rose from 5,785 in January to the peak of 9,500 in April, fell to 2,412 in June, again rose steadily during July and August, but declined to 2,485 in October and rose for the third time to 6,043 in December. The districts of 24-Parganas, Howrah and Noakhali returned the highest death rates, these being double the figures for 1934. Urban death rates were 55% higher than those for 1934 and rural rates 20% higher. Recorded deaths totalled 4,770 in towns and 54,835 in rural areas.

C. P.—A virulent epidemic caused 39,374 cases and 20,140 deaths, the death rate being 1·3 p. m.; of the total, 1,237 deaths occurred in urban and 18,903 in rural areas. The epidemic originated during February at the Bhandakpur fair in Saugor district where infection was introduced by pilgrims from Allahabad and infection was spread to neighbouring and other districts by dispersing pilgrims. The districts of Bilaspur, Drug and Raipur in Chattisgarh division suffered most; the disease spread to Berar in April but was soon stamped out. A second invasion of Berar occurred in September, this time the infection originating from the Pandharpur fair in Bombay Presidency. During September and October, practically the whole province was in the grip of the disease but it began to subside in the last week of October and practically disappeared by December.

Bombay.—Recorded deaths numbered 11,235, with a case mortality rate of 46%, as against 11,362 in 1934 and 10,860 the quinquennial mean.

The heaviest incidence occurred in the Southern Registration District with 5,178 deaths; the Central Registration District had 4,904 deaths, the Northern 1,096 and Sind Registration district only 44.

Madras.—A severe epidemic which spread to every district except the Nilgiris followed the usual trend and caused the largest numbers of attacks and deaths during the winter months. Deaths totalled 35,456, giving a death rate of 0·8 p. m. this being double the figure for 1934 and the highest since 1928. The districts of North & South Arcot, Tanjore, Chingleput and Tinnevelly suffered worst and were responsible for 60% of the total deaths. Early in the year, infection was fairly severe in the central districts of the province, but by April only sporadic cases were reported. The epidemic again flared up during a festival at Conjeeveram in May and was disseminated by the returning pilgrims. Three distinct peaks were observed, the first in January, the second in July and August and the third in November.

Coorg.—The disease was absent.

Assam.—Total deaths rose from 1,904 in 1934 to 7,436 and the death rate was 0·9 p. m. The disease was for the most part confined to the districts of Sylhet, Goalpara, Darrang and Kamrup. The out-break in Kamrup was severe and although at first the outbreak was sporadic in nature it later assumed an epidemic form which resulted in 2,851 deaths. Infection in the Surma Valley and in the remaining districts was sporadic. Practically all the deaths occurred in rural villages of which 1,509 were infected. Deaths in tea gardens totalled 137. The disease was said to have been imported by emigrants from Bengal.

Burma.—The death rate was the highest since 1930. At the beginning of the year the epidemic was severe in the Irrawaddy division, whilst later on Pegu and Tenasserim divisions became infected, the latter area suffering severely. The seasonal prevalence was most unusual; whilst hitherto epidemics have usually occurred between April and July, the present epidemic increased in intensity between January and April, subsided in May and June, again rose in July and August and declined steadily towards the end of the year. The disease prevailed mainly in rural areas. The districts of Mergui, Tavoy, Maubin, Pyapon, Kyaukpyu and Amherst, which all recorded a high mortality, offer favourable opportunities for the widespread extension of the disease once a focus of infection has been established, because they are intersected with creeks and a large part of the population live in boats or on the banks of the creeks.

Ajmer-Merwara.—Only 4 deaths were recorded.

(c) *Anti-Cholera measures.*

Routine sanitary measures, such as improvement and disinfection of water-supplies in villages and at *melas*, improvement of conservancy, medical inspection of pilgrims at railway stations, enforcement of temporary regulations under the Epidemic Diseases Act, employment of epidemic staffs and propaganda were adopted in various centres as and when necessary. Inoculation with cholera vaccine remains the most effective method of personal prophylaxis. Details of anti-cholera inoculations performed during 1935 in different provinces will be found in Appendix II, Table C, page 228.

In the *U. P.*, the cases imported from Nepal state were treated at the barrier posts in the districts of Gorakhpur and Basti. The anti-cholera scheme was continued in 23 districts and 44,106 lbs. of potash permanganate, 8,987 lbs. of Kaolin and 2,154 lbs. of essential oil mixture were issued. The scheme

under which early reports of outbreaks are made by revenue subordinates in the districts of Gorakhpur, Basti and Azamgarh was continued. Grants aggregating Rs. 6,637 were given to district authorities for anti-cholera measures. Temporary regulations under the Epidemic Diseases Act were enforced in some districts and municipalities. In *B. & O.*, with the growth of district health organisations, more efficient and trained staffs were available to deal quickly with outbreaks of cholera. Epidemic doctors were also appointed temporarily to assist with serious outbreaks. Stocks of disinfectants were as usual kept in reserve by district boards. Of the 110,555 phials of 50 c.cs. each of choleraphage prepared at the bacteriological laboratory, 104,359 were issued. Because of shortage of staff it was not possible to compile full statistical details except for Muzaffarpur and Purnea districts. The D. P. H. makes the following remarks :—

" The extensive application of 'phage during the widespread epidemic of cholera in the province this year as well as last year appears to support the favourable results obtained during the last five years. As a curative agent choleraphage appears to give the best results even in the rural areas and as a prophylactic agent it also seems to cut short the course of the epidemic provided immediate steps are taken to 'phage the total population exposed to infection. During the Rathjatra festival at Puri, choleraphage was mixed with drinking water-supply with satisfactory results. "

In *C. P.*, in addition to the vaccination staff of district councils, all available Government medical forces of the Medical and Public Health Departments were placed on cholera duty in the affected areas. The opening of ten temporary epidemic dispensaries was sanctioned. A total of 23,496 wells were treated with permanganate.

In *Bombay Presidency* a grant of Rs. 4,000 was sanctioned by Government for anti-cholera measures.

In *Madras Presidency* the use of cholera bacteriophage was discontinued as the results obtained were not encouraging.

In *Assam* bacteriophage was being " tried out " in Nowgong district and in the Habiganj subdivision of Sylhet district and a total of 1,020,481 doses of bacteriophage were issued during the year, but the results were not very encouraging.

In *Burma* preventive measures included propaganda campaigns, the purification of water supplies with bleaching powder and certain restrictions on the celebration of fairs and festivals. An enquiry made in 4 districts showed 18 deaths among the inoculated, of whom 8 occurred within 72 hours of inoculation or before immunity was conferred. A total of 211,907 inoculations were performed in the districts of Mergui, Pyapon, Maubin and Pakokku.

Plague.

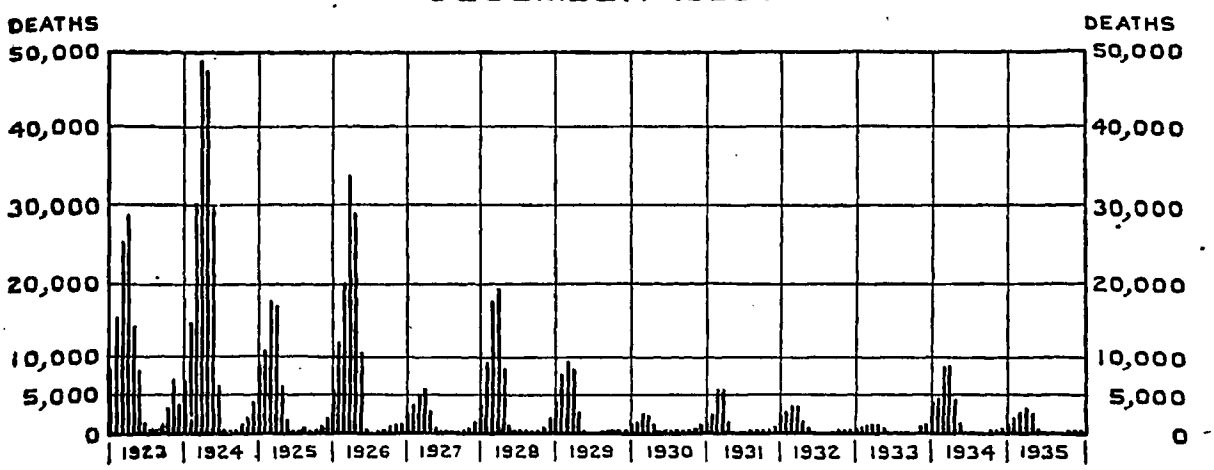
(*a*) *General.*

14. Plague does not now present the serious problem which it did in the earlier years of the pandemic. This disease, in fact does not now form a major pre-occupation of any Public Health Department, although local outbreaks of some severity still occasionally occur and in certain restricted areas endemic conditions may prevail over a short period of years. The extent to which the disease has decreased since its introduction in 1896 is shown by the following average annual mortality figures :—

1898-1918	500,000
1921-1935	100,000
1931-1935	50,000
1935	32,000

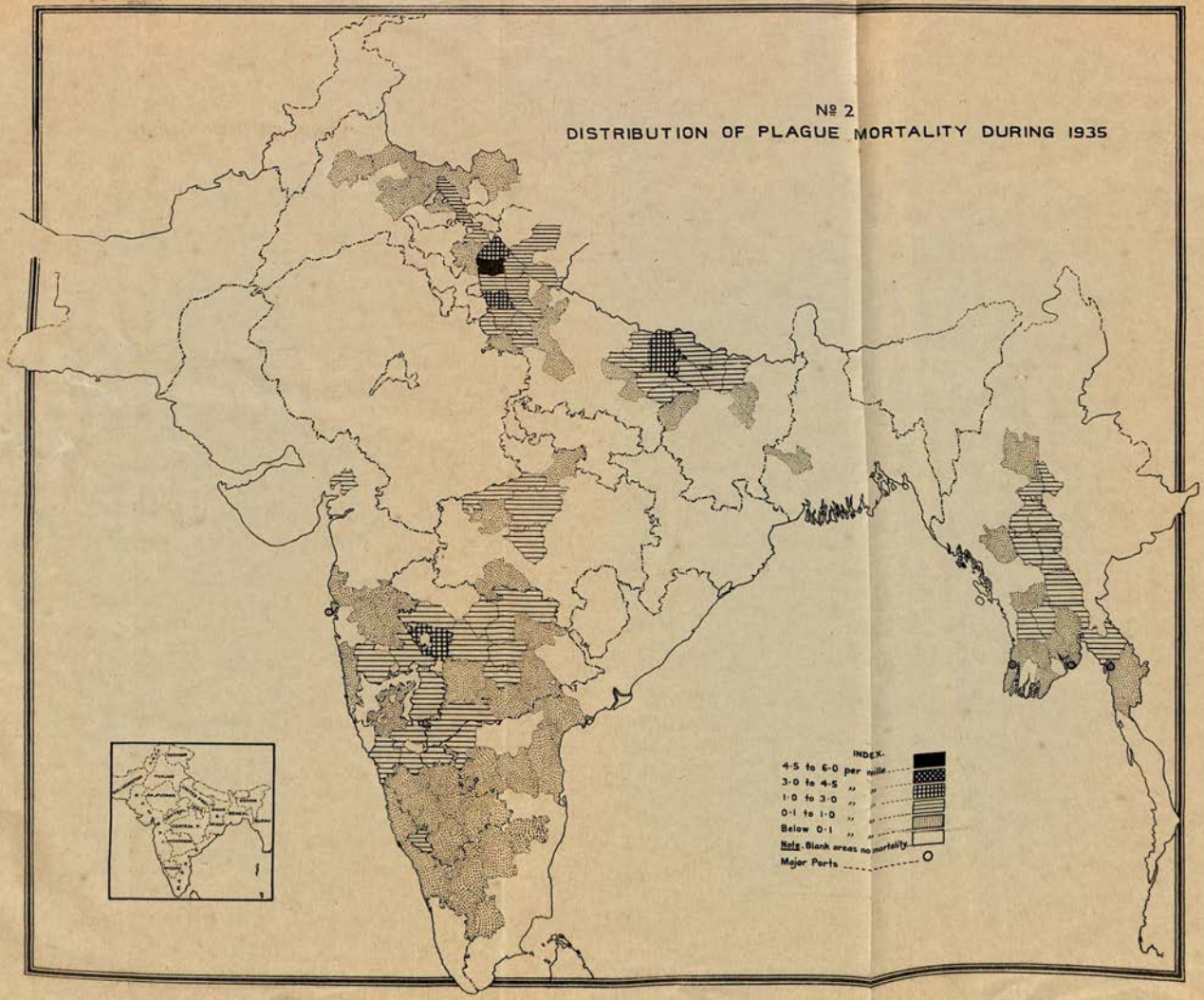
№ 5

PLAGUE DEATHS REPORTED IN NORTHERN INDIA,* BY FOUR-WEEK PERIODS, FROM JANUARY 1923 TO DECEMBER 1935.



* N.W.F.P., Punjab, Punjab States, U.P., B. & O., and Kashmir.

Note:-Supplied by League of Nations.


№ 2
DISTRIBUTION OF PLAGUE MORTALITY DURING 1935
INDEX.
4·5 to 6·0 per mille
3·0 to 4·5 ,, ,,
1·0 to 3·0 ,, ,,
0·1 to 1·0 ,, ,,
Below 0·1 ,, ,,
Note. Blank areas no mortality
Major Ports

Compared with 1934, the number of deaths and the death rate fell from 80,131 and 0·3 p. m. to 32,091 and 0·1 p. m., respectively. This decrease occurred in all provinces; details are given in Table E in appendix II, page 229. Madras and Bombay Presidencies recorded the lowest figures since the introduction of the disease. In the U. P. the epidemic was confined largely to the western districts.

The reasons for the gradual but steady decline in the incidence of plague in India might form the subject of an interesting speculative essay, although history indicates that on several previous occasions pandemics of infectious disease have died out just as plague now seems to be dying out in this country. One thing is certain; the decrease cannot be attributed, at least in rural areas, to permanent improvement in sanitary standards. Housing and other conditions inherently favourable to the rat populations are to a large extent essentially the same as when plague first made its appearance in Bombay forty years ago. Experimental work carried out during the past few years suggests a possible factor favouring reduction of plague incidence. In the course of testing the relative susceptibility to the plague bacillus of rats from different parts of India, it has been found that they present a degree of immunity roughly proportionate to the prevalence of plague in past years in the areas from which they have been obtained. For instance, rats from places like Madras City which have remained entirely free from plague are highly susceptible, whilst those from areas which have experienced frequent and severe epidemics are able to resist considerable doses of *B. pestis*. The inference is that this increased immunity has played some part in reducing the incidence of the disease among rats and consequently in lowering the level of the incidence in man.

In India plague has been almost entirely bubonic in type, the pneumonic form of the disease being of rare occurrence and then only in very restricted fashion. During 1935, the deaths numbered 27,198 in rural areas and 4,893 in urban areas, but as might be anticipated the urban rate 0·2 p. m, was double the rural rate. The disease has always shown a definite seasonal incidence which varies somewhat with the varying climatic conditions of different parts of the country. Climatic factors probably exert an influence chiefly through their effect on (*a*) total flea prevalence, (*b*) length of life of the flea and (*c*) the production of Bacot's " blocking " phenomenon in relation to (*a*) and (*b*). During the year under review the highest mortality was recorded in April and the lowest in July, during which month the epidemic in the U. P. reached its peak. Seasonal variations in the different provinces are indicated by the figures given in Appendix II (page 229). Some of the Indian States also experienced mild epidemics. The number of deaths in the Deccan States Agency decreased from 4,547 to 547; in Mysore from 5,296 to 1,822; in Hyderabad from 11,465 to 3,421; in Jammu only 8 deaths were recorded as against 1,043 in 1934.

Map No. 2 gives the distribution of deaths by districts, during 1935.

(*b*) *Provincial.*

N.-W. F. P.—Plague was again absent.

Punjab.—The incidence was almost the lowest on record; on this fact the D. P. H. makes the following remarks :—

" A very intensive campaign of off-season deratting operations and cleansing of the infected and suspected villages had been carried out last year and no effort was spared to suppress the very first manifestation of infection with inoculations on an intensive scale, reduction in rat infestation and disinfection to destroy fleas. It appears that the rising wave of recrudescence aborted. "

Of the 1,085 deaths, 976 occurred in British districts and 109 in Indian States (Patiala 91 and Kapurthala 18), whilst nearly 80% of the total was recorded in the districts of Hoshiarpur (493 deaths) and Ambala (276). Deaths in urban areas totalled 240 in 14 towns; those in rural areas 786 in 155 villages. The disease was ordinarily bubonic in type but a pneumonic outbreak occurred in Gurdaspur district.

Delhi.—Only one non-fatal case was recorded.

U. P.—The death rate was only one half that of 1935. Except for Gorakhpur, infection was confined to the Meerut and Agra divisions. Muzaffargarh district with a death rate of 6 p. m. was worst affected.

B. & O.—In certain isolated tracts in the districts of Saran, Muzaffarpur, Darbhanga and North Monghyr plague starts almost every year with the approach of the winter season and reaches its maximum during February and March. During 1935, nearly all the 2,861 deaths occurred in these 4 districts, Saran district alone recording half the total. The death rate was 0·1 p. m.

Bengal.—Only two deaths occurred in Burdwan rural district.

C. P.—The epidemic was of a mild type, 7,966 cases with 796 deaths being recorded and the death rate 0·05 p. m. Deaths were reported throughout the whole year, with the exception of June, but only 8 districts were affected. Of the total 109 deaths occurred in urban and 689 in rural areas.

Bombay.—Total cases numbered 4,070 and deaths 2,453, the last figure being the lowest recorded since 1896. Only 248 villages were reported as infected. The death rate was 0·1 p. m. and 501 deaths (0·1 p. m.) were recorded in urban and 1,952 (0·1 p. m.) in rural areas. The D. P. H.'s remarks regarding the low incidence may be quoted :—

"....in spite of occasional epidemic waves the incidence of the disease has maintained a progressive decline during recent years. A tendency of the peaks to become lower and the epidemic curves shorter is also noticeable. However, systematic and sustained anti-plague measures are necessary to bring the disease under complete control by its extermination from the epidemic centres."

Of the total, 1,779 or 73% occurred in the Southern Registration district, chiefly in rural areas. An enquiry made into 1,971 cases in this area showed that 80 attacks and 28 deaths occurred among the inoculated, the case mortality rate among the inoculated and the uninoculated being 35% and 63% respectively.

Madras.—Only 645 deaths were recorded, the mortality being the lowest since the disease was introduced some 37 years ago. The disease was as usual mainly confined to the endemic areas bordering on the Mysore Plateau and in the Cumbum Valley in Madura district. For the first time since 1920 the Cumbum Valley was entirely free for over three months and the epidemic was confined entirely to the northern half of the valley.

Coorg.—The disease existed only in sporadic form, only 25 deaths with a rate of 0·5 p. m. were recorded, 14 in rural and 11 in urban areas.

Assam.—As usual plague was absent.

Burma.—The death rate was the second lowest since the appearance of the disease in 1905. The seaboard districts of Arakan, Tavoy and Mergui were as usual free and only in Meiktila district was the disease a serious problem. In the township of Mahlaing in this district the main trade is cotton, whilst juggery is produced on a large scale from the *hlanbin palm.* The leaf of this palm is used for roofing and for walls and the spaces between the palm leaves provide suitable nesting places for rats. Although pneumonic plague is very rare, 31 deaths from this cause were recorded in Tharrawaddy district.

Ajmer-Merwara.—The disease was absent.

(*c*) *Anti-plague measures.*

Inoculations with anti-plague vaccine are carried out as a routine in all infected areas and their number usually depend on the severity of the epidemic. Details of inoculations done in different provinces will be found in Appendix II, Table E, page 229.

Rat destruction—Punjab.—An intensive deratting campaign by baiting, trapping and smoking operations was successfully carried out during the off-season especially in those areas which were infected at the end of the season or which threatened to form recrudescent foci during the ensuing cold weather.

Delhi.—Rats killed in urban areas totalled 381,977 and in rural areas 364,319 at a total cost of Rs. 21,102 and Rs. 13,295, respectively.

U. P.—The anti-rat campaign was continued in 22 districts, 36 municipalities and 6 notified areas and a total of 2,167,087 rats were destroyed. 4,220 lbs. of barium carbonate were issued free and grants-in-aid aggregating Rs.6,785 were given to district magistrates and local bodies for preventive measures. Fumigation by Cyanogas was started in 5 districts and 3 municipalities.

C. P.—An anti-rat campaign was carried out in a number of towns; 606,415 rats were killed at a cost of Rs. 40,628.

Bombay.—Ratting operations were carried out in a number of towns and villages in all three Registration districts. Excluding Bombay city, a total of 989,629 rats were caught and destroyed; of 90,771 examined 62 were found infected. In Sind the number destroyed was 150,326.

A special grant of Rs. 6,100 was sanctioned by Government for cyanogas fumigation work in selected villages in Karnatak districts. These operations were placed in charge of a specially trained medical officer.

Madras.—Fumigation of rat burrows with cyanogas was carried out extensively, particularly in the endemic areas. In order to encourage local bodies to adopt this measure Government sanctioned Rs. 8,000 to meet half the cost. A few more rat-proof godowns were constructed in Cumbum Valley.

The mian lines on which investigations were continued in the Cumbum Valley were (*i*) the factors responsible directly or indirectly for recrudescence of plague; (*ii*) the relative preventive value of cyanogas fumigation of rat burrows and houses under different conditions; (*iii*) the value of cyanogas fumigation for grain consignments; and (*iv*) a survey of rat fleas and seasonal variations of the different species. The testing of fleas and rats from a given locality was found to be helpful in detecting latent or smouldering infection.

A total of 3,039 house rat (*R. rattus*), 2,775 house mice (*m. urbanus*) and 448 bandicoots (*b. malabarica*) were examined both by group animal tests and by smears. Six positive groups and 8 positive smears were obtained. Two of the positive groups were from already infected villages, three from Cumbum town and one from an apparently uninfected village which reported plague two weeks later. The blocks in Cumbum town which gave positive group tests were immediately fumigated with cyanogas and no outbreak of plague occurred. 2,194 fleas were also examined by group tests, six groups being positive. Three of these were from infected rats, one from a village which reported plague soon after and the other two were from Cumbum town. Eleven of the individually tested fleas were positive and included *6 X. astia, 4 X. cheopis and 1 Ctnocephalus canis.* Eight of these fleas were positive obtained from an infected village and the other three from a house which had reported a rat fall. Saturation deficiency in the rat burrows was at its maximum in May and June and was at a minimum in November and December. Fourteen of the 93 villages treated with cyanogas later became infected. Infection was moderately severe in the four bigger villages but comparatively mild in the other smaller villages. Nine villages have mild plague outbreaks within an interval of 3 to 12 months after fumigation. In another group, the disease broke out only in one untreated village, whilst all those fumigated remained free.

Experimental fumigation of grain consignments was carried out in the fumigation chamber at Kumili on the Travancore frontier. The chamber has a capacity of 3,000 cubic feet and can deal with 40 to 50 cart loads at a time. When the chamber is filled, its door is covered with an oiled tarpaulin. Three hours' exposure of a concentration of 3 oz. of HCN gas per 1,000 cubic feet was found to be sufficient to kill all fleas buried in bags of rice, cholam, black gram, Bengal gram, horsegram, corriander, onions, etc. Smaller grains like *ragi* and articles like bran and coffee husk do not permit the gas to penetrate sufficiently so that even a dose of 6 oz. of HCN per 1,000 cubic feet does not kill all the fleas.

In December, the cheopis index was only one, the lowest during the past five years and an index of 1·08 was obtained during April, May and June. Other conditions being favourable, a cheopis index of 1 is said to be high enough to start and maintain an epidemic. A few ceratophyllus fleas were caught at Chellarkoil Mettu situated on the border of Cumbum Valley at an altitude of 3,500 feet. A few *X. brazilinesis* were also found in the same place.

Burma.—Of the 840,576 rats destroyed, 769,632 were caught in Rangoon town. Cyanogas was used as a fumigant in 49 towns and 20 districts.

Smallpox.

(*a*) *General.*

15. Graphs illustrating annual smallpox mortality for individual provinces still show periodic high peaks and in most areas another peak occurred during 1935, after a 4 years' interval. The number of cases rose to 280,881 as against 261,242 in 1934, whilst the deaths from smallpox totalled 90,703 as against 83,928 in the previous year. Nearly 80% of the cases and over 73% of the deaths occurred during the first half of the year, this being a common feature of the disease. The Deccan and the Gangetic Plain suffered worst. In Bombay Presidency the incidence was the highest since 1930, whilst the U. P. and B. & O. together were responsible for more than 50% of the total mortality and Madras and Bombay Presidencies for over 25%. High death rates were recorded in Ajmer-Merwara (1·5 p. m.), B. & O. (0·6 p. m.), Bombay (0·6 p. m.), Delhi (0·6 p. m.), and the U. P. (0·5 p. m.). Map. No. 3 illustrates the variations in mortality by districts.

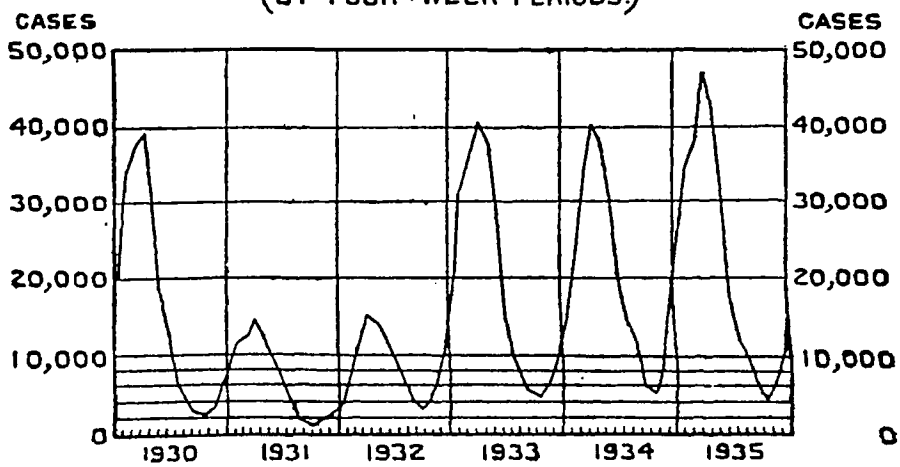
The general urban death rate 0·6 p. m. was double that in rural areas. Urban rates were higher than rural in the Punjab, Delhi, U. P., Bengal, C. P., Madras, Coorg and Burma.

The periodic occurrence in India of widespread epidemics of smallpox has been the subject of adverse comment on numerous occasions and prejudiced persons have used the figures given in these reports in attempts to prove that vaccination is of no value as a preventive against smallpox. The facts are that each year 8 to 10 million persons submit to primary vaccination, an additional 12—15 millions are revaccinated and many thousands acquire a natural immunity after passing through an attack of smallpox. These three groups give the total number of persons protected each year, but when compared with the total population they comprise a small percentage only. Another outstanding fact is that only very rarely do attacks of smallpox occur among the vaccinated, a fact which speaks well for the potency of the lymph. On the other hand, there are several factors which handicap vaccination work. In many of the provinces, the health organisations are very defective and supervision of vaccinators, particularly in rural areas, is either non-existent or is performed in a perfunctory manner. For the same reason outbreaks of the disease are not reported promptly to the health authorities and infection becomes widespread before information is available and necessary action can be taken. Where satisfactory health organisations exist,—and these are now to be met with in various parts of the country,—satisfactory results have generally been obtained. Again, the system of registration of births is such that

No 6

CASES REPORTED DURING THE YEARS 1930 – 1935

(BY FOUR-WEEK PERIODS.)



NOTE - Reproduced from the League's Weekly Epidemiological Record for December 23rd 1936 R.H.565.

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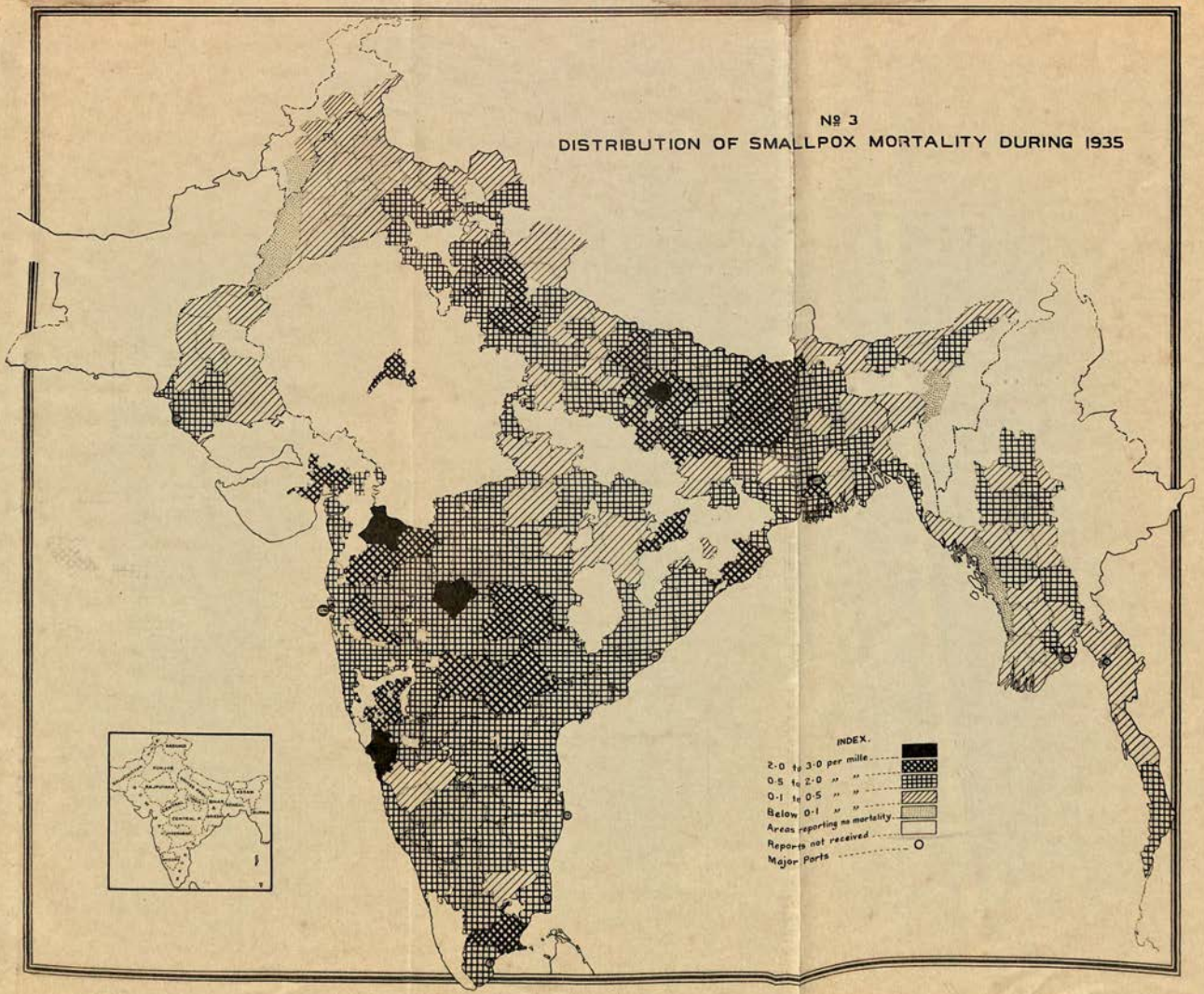
№ 3
DISTRIBUTION OF SMALLPOX MORTALITY DURING 1935
INDEX.
2·0 to 3·0 per mille
0·5 to 2·0 " "
0·1 to 0·5 " "
Below 0·1 " "
Areas reporting no mortality
Reports not received
Major Ports

a considerable proportion of the infants does not appear in the birth registers and as a result these escape notice by the vaccination staffs. In at least one province, it has long been the custom to employ the vaccinators during the non-vaccination season in detecting unregistered births and many thousands annually have been so discovered. If this practice were made more general, there is little doubt that a much larger proportion of the child population of the country would benefit by the protection conferred by vaccination and the percentage of smallpox cases in the child population would decrease. A further handicap lies in the fact that vaccination Acts making primary vaccination compulsory have not yet been universally applied even to urban and municipal centres. Existing legislation needs to be revised in order that both primary vaccination and revaccination should be made compulsory both in urban and rural areas.

According to the recorded statistics, the case mortality rate was 32 %, the same figure as last year, but as the registration of cases is much less satisfactory than that of deaths, it is certain that the mortality rate was considerably less than this figure would indicate. It may be added here that a number of experienced health officers believe that the disease now prevalent in India is less virulent than it previously was. Of the total deaths, 20% occurred among infants under one year and 30% among children aged 1—10 years. In other words, half of the total mortality occurred among young children. In India, therefore, smallpox continues to be largely a disease of infancy and this fact makes it only too evident that further efforts to raise the numbers and percentage of protected infants are urgently necessary. Some of the handicaps under which provincial health authorities work have been mentioned, but whilst these are serious obstacles in the way of advance the figures quoted in Section VI giving average numbers of vaccination operations performed by each vaccinator indicate clearly that much more might be done by existing staffs if only the provincial health services were so developed as to ensure suitable supervision of the vaccinators' work. In one direction, at least, additional staff is required. For vaccination work among women and children, female vaccinators are much to be preferred and both municipal councils and local boards would be well advised to appoint women vaccinators to their health staffs in order to promote this branch of preventive work.

Graph No. 6 shows the periodicity of smallpox in India during the last 5 years; in 1935 the highest mortality was recorded in May and the lowest in October.

(*b*) *Provincial.*

N.-W. F. P.—209 cases with 86 deaths were recorded in the Settled districts, of which 69 deaths occurred in the districts of Hazara and Peshawar and 28 and 22 respectively in the Agencies.

Punjab.—Total deaths numbered 1,822. Of these 531 occurred among infants and 887 among children aged 1—10 years. The urban death rate increased slightly and the rural rate decreased.

Delhi.—Cases and deaths totalled 737 and 427 respectively as against 51 and 22 in 1934 and the death rate rose to 1 p.m. Of the total, 192 cases and 139 deaths were infants; 296 and 204 were children aged 1—4 years; 71 and 37 were in the age-group 5—9 years; 27 and 6 among those between 10 and 14 years; 70 and 19 between 15—19 years; 70 and 18 between 20—29 years and 11 and 4 between 40 and 60 years. Fifty per cent of the total occurred in April and May. 383 deaths were recorded in Delhi City, 27 in the Notified Area Civil Lines, 11 in New Delhi and only 6 in rural areas.

U. P.—The death rate was almost double that for 1934 and three times the quinquennial mean. High mortality was registered in the districts of Ghazipur (3·0 p.m.), Azamgarh (2·0 p.m.) and Budaun (2·0). Several small towns recorded death rates lying between 17 p.m. and 34 p.m.; these suggest that vaccination work had been seriously neglected for years and it is to be hoped that stringent steps have been taken to improve matters.

B. & O.—Deaths totalled 22,976 with a death rate of 0·6 p.m. as against 0·8 p.m. in 1934. This decrease is attributed to the high immunity conferred by extensive vaccinations and revaccinations carried out in 1933 when a severe smallpox epidemic raised the death rate to 1·1 p.m. As usual, rural areas suffered more than urban; the highest rates were recorded in the districts of Purnea 2 p.m. and Sambalpur 1·5 p.m.

Bengal—Compared with 1934 and the quinquennial mean, there was a 50% reduction in the mortality. After 327 deaths in January, the figures rose steadily to 1,211 in April and then declined to a minimum in October. As in the previous year, Calcutta reported the highest mortality (1 p.m.). Of the total, 2,269 deaths (0·6 p.m.) occurred in towns and 5,279 (0·1 p.m.) in rural areas. The deaths included 400 infants under 1 year or 5% of the total and 910 children between 1—10 years or 12% of the total.

C. P.—There were 15,479 cases and 2,802 deaths, giving a death rate of 0·2 p.m. Of the total, 958 deaths occurred among infants under 1 year and 1,177 among children between ages 1—10 years. Deaths in rural areas numbered 2,165 and in urban areas 637.

Bombay.—The 1935 epidemic was the worst since 1930. Cases totalled 62,088 and deaths 13,976, giving a death rate of 0·6 p.m., as against 7,834 (0·4 p.m.) the quinquennial mean and 21,341 in 1930. Every district was more or less affected, but the death rate was highest in the collectorates of West Khandesh (3 p.m.), Kanara (3 p.m.), East Khandesh (2 p.m.) and Nasik (2 p.m.). The D. P. H. makes the following observation :—

" From the statistics of smallpox epidemics in this presidency it seems that the type of smallpox is less virulent than it is generally supposed to be. A fatality rate in the neighbourhood of 40 is often quoted in support of the malignant type of smallpox in Eastern countries. A writer in the United States has calculated 42·3 as the case fatality rate for British India for the years 1926—30. In Bombay Presidency the fatality rate for the same period was 20·2 and for 1931—35 it was 22·4. Registration of vital statistics has improved considerably in recent years but cannot be claimed to be perfect. Apart from births the error, however, now and before has been greater in morbidity than in mortality and if this fact is kept in mind the case fatality rates would presumably be even lower than those quoted above. It is reasonable therefore to deduce that the dreaded classical or malignant type of smallpox with a very high fatality rate has undergone a change during the last 10 years. It may be rash to forecast that this decrease of virulence may take the form of variola minor in the near future in India but there is clear evidence to show that the increase of vaccination has a decided effect in lowering the virulence of the disease."

" The other effect of vaccination, *i.e.* prevention of smallpox is also equally evident in this Presidency. During the 5 year period 1926—30 the total number of primary vaccinations and revaccinations was 821,666 and during the subsequent 5 years the number was 1,082,585. The increase of 33% may naturally be expected to show some decrease in the attack rates which work out at 223·58 per 100,000 population for the first period and 124·51 for the second period, a decrease of 45 %."

" Although there is considerable reduction in the second of the two periods of all years for which statistics are available, the attack rate in the Presidency is very high as compared to the rates of other countries. In countries like Bulgaria, Germany, where social an economic conditions vary widely but vaccination is compulsory, the attack rate is 0·15 per 100,000 population whereas it is 124·51 in Bombay Presidency. At the present stage it may be said that the majority of children are vaccinated during the first year of life, but, in spite of some increase in revaccinations, a very small percentage of the adult and adolescent population is revaccinated. Smallpox which was supposed to be

entirely a disease of children has shifted the age period and many adolescents and adults now contract the disease. The need of revaccination is thus apparent."

Of the total, 4,114 deaths were infants and 6,839 children between 1—10 years of age ; in other words, 78% of the deaths were among children.

Madras.—Smallpox was widely prevalent and 12,330 deaths with a death rate of 0·3 p.m., were recorded. Of the total, 1,530 deaths were reported in municipalities. Mortality was at its maximum during the first quarter, but in Ramnad which was worst affected, the maximum occurred during the third and fourth quarters. Infants under one year accounted for 27 % of the total mortality, children between 1 and 10 years for 30% and adults for 43%. Vigorous campaigns in connection with infant vaccination carried out in recent years are said to have resulted in the reduction of infant mortality from smallpox from 45% of the total smallpox deaths in 1926 to 27% during the year under review.

Coorg.—Forty-two deaths were registered, 28 in rural and 14 in urban areas.

Assam.—The number of deaths increased from 206 to 529, the death rate being 0·07 p.m. as compared with the decennial average of 0·3 p.m. Only 240 villages out of 28,333 were affected.

Burma.—All districts but two were infected. Eight per cent of the deaths were among infants, 22% among children aged 1—10 years and 70% among others.

The D. P. H. remarks :—

"The Vaccination Act which enforces primary vaccination in children who have attained the age of six months has been in force in Burma since 1883 in the towns and since 1923 in the rural areas. The vast majority of the people get vaccinated as children and the value of primary vaccination is recognised generally. Until the necessity for re-vaccination is similarly appreciated, the annual mortality among people over ten years of age will be difficult to avert."

Ajmer-Merwara.—Deaths totalled 880 against 438 in 1934. The death rate was 1·5 p.m.

(c) *Isolation hospitals.*

In British India no hospitals are exclusively reserved for the isolation of smallpox patients nor is accommodation provided for contacts. Such information as is available of the vaccinal history of smallpox cases treated in hospital is given in Table II (*i*).

TABLE II (*i*).

	Smallpox patients.	One or more vaccination scars.	Stated to have been successfully vaccinated but no vaccination scar present.	Stated to have been unvaccinated or vaccinated unsuccessfully but no vaccination scar present.	Previously unvaccinated but vaccinated during incubation period of smallpox.	Stated to have been successfully re-vaccinated.
U. P.	513	245	3	187	3	16
Bengal	765*	328	34	340	24	32
C. P	194	97	5	84	8	..
Bombay	258	113	12	120	6	7
Madras	844	606	96	134	..	8
Assam	11	7	..	3	..	1
Burma	607	355	..	252	..	..

* Particulars of the 7 cases were not recorded.

Fevers.

(a) *General.*

16. Compared with the last year and the decennial mean, the number of deaths recorded during 1935 under ' fevers ' show a small decrease at 3,754,751, but the variation is no greater than might occur by chance. It is illuminating to note that of this total 2,744,000 or 73% were recorded in the cold northern areas of India stretching from the N.-W. F. P. to Bengal, whilst 805,000 or 22% occurred in the milder climates of South India and the Deccan. 3,542,096 deaths were registered in rural and 212,655 in urban areas but the proportion between these totals is much the same as that between the total rural and urban populations so that this variation does not seem to exert any influence on the incidence of the ' fevers ' of India.

As usual rural rates much exceeded urban in all provinces.

Tables H and I in Appendix II on page 231 give further details as well as an analysis of the " fevers " figures for certain provinces.

(b) *Provincial.*

N.-W. F. P.—Fever deaths numbered 36,939 which gives a death rate of 15 p.m. Of these, 33,940 deaths occurred in rural and 2,999 in urban areas, the death rate being 17 p.m. and 9 p.m., respectively.

Punjab.—The total of 396,321 deaths gave a death rate of 16 p.m. Maximum mortality was recorded in January (42,076) and the minimum in March (27,199). The urban death rate was 10 p.m. and the rural 18 p.m.

Delhi.—Deaths numbered 11,965 with a rate of 19 p.m. Fifty per cent of the total deaths occurred during May, June, September and October. The female death rate of 23 p.m. exceeded the male 16 p.m. The urban death rate was 15 p.m. and the rural 24 p. m.

U. P.—This group was responsible for 929,298 deaths with a death rate of 19 p.m. Maximum mortality occurred in June (101,557 deaths) and the minimum in December (64,167). The urban death rate was 13 p.m. and the rural 20 p.m.

B. & O.—No less than 663,964 deaths or 68% of the total were recorded as due to fevers. The death rate was 18 p.m. 10,177 deaths occurred in urban and 653,787 in rural areas. The highest death rates were recorded in the districts of Angul (27 p.m.), Palamau (25 p.m.) and Gaya (23 p.m.).

Bengal.—705,628 deaths, or 65% of the total, were recorded as due to fevers. The death rate was 14 p.m., a figure considerably lower than that of 1934. The maximum number was recorded in December (82,078) and the minimum in June (44,429). Of the total, 691,624 deaths were in rural and 14,004 in urban areas. The rates for rural and urban areas were 14 p.m. and 4 p.m. respectively.

C. P.—Deaths from fevers numbered 281,367 giving a death rate of 18 p.m. Of these 19,748 occurred in urban and 261,619 in rural areas. The rates for rural and urban areas were 18 p.m. and 11 p.m. respectively. Maximum mortality was reported in October (31,559) and the minimum in February (14,500).

Bombay.—The number of deaths registered as due to ' fevers ' was 204,752, giving a death rate of 9 p.m. The rates for rural and urban areas were 10 p.m. and 6 p.m. respectively. Death rates varied between 17 p.m. in the Collectorate of East Khandesh and 9 p.m. in Dharwar.

Madras.—A total of 315,998 deaths were recorded as due to fevers, the death rate being 7 p.m. Districts recording high fevers mortality included East Godavari Agency, Vizagapatam, Ganjam and Kurnool. The mortality was at its maximum in August, September and December. An investigation made in certain villages of Vizagapatam district which has recorded high "fever" death rates showed that only 41% of those deaths were actually due to that cause. The urban death rate was 3 p.m. and the rural 6 p.m.

Coorg.—Deaths numbered 2,804 and the death rate was 17 p.m. Of the total, 2,759 deaths occurred in the rural district and only 45 in towns, the death rates being 18 p.m. and 5 p.m.

Assam.—"Fevers" were said to be the cause of 106,719 deaths or 63% of the total. The largest number of deaths was recorded in June (11,823) and the smallest in March (5,883). Goalpara district reported the very high death rate of 24 p.m. whilst the lowest rate was in Sibsagar (9 p.m.).

Burma.—Fevers were the cause of 88,426 deaths or 36% of the total mortality. The death rate was 7 p.m. and the rural and urban rates were 8 p.m. and 3 p.m. respectively. The D. P. H. says :—

"Mortality from this group of fevers is mainly reported from the rural areas where the village headmen are the registrars. The vast majority of cases with a rise in temperature are classified under this heading. In spite of this unsatisfactory diagnosis, there is no doubt that malaria causes a considerable portion of these deaths."

Ajmer-Merwara.—Fever deaths totalled 10,569, equivalent to a rate of 18 p.m. 9,193 deaths occurred in rural and 1,376 in urban areas.

Malaria.

(*a*) *General.*

17. Judging from attendances at hospitals and dispensaries and from deaths recorded as due to malaria, this disease was somewhat less severe in 1935. Table H on page 231 shows that 1,632,083 deaths, or about 44 % of the total "fevers" deaths, were ascribed to this disease.

Improvements in registration would no doubt give a more accurate picture; in some areas the malaria mortality might be higher, in others it would almost certainly be lower. Meantime it is unfortunately impossible to obtain closer relationship to accuracy. According to the recorded figures 1,560,646 deaths, or 96 % of the total, occurred in rural areas. Assuming for the moment that approximately one third of all deaths recorded as due to "fevers" were caused by malaria, we reach an estimate of 1,251,584 deaths in British India during 1935. Remembering the defects in registration, the difference between this figure and that of recorded deaths is not a matter for great astonishment. It may perhaps be safely assumed that the recorded total is an exaggerated figure and that the actual truth lies somewhere round the estimate of 1¼ million deaths. Even at this lower level, the fact remains that malaria is the most prevalent and most fatal disease in India causing immeasurable misery and acting as a powerful deterrent to economic progress.

Table II (*ii*) gives total hospital attendances for malaria by provinces for 1935.

TABLE II (*ii*).

	Cases.	Percent of total cases treated.
Total	11,014,137	14
N.-W. F. P.	455,715	20
Punjab	1,846,147	12
Delhi	163,478	15
U. P.	1,174,475	13
B. & O.	918,917	13
Bengal.	2,877,825	28
C. P.	470,066	13
Bombay	629,826	16
Madras	1,069,669	6
Coorg	125,349	10
Assam	766,896	30
Burma	385,284	14
Baluchistan	130,490	18

(*b*) *Provincial.*

N.-W. F. P.—Although malaria continued to be the most prevalent disease in the province, its incidence was lower than in 1934. Parts of the rural areas were heavily infected and the splenic index there was high. In Chaudhwan in D. I. Khan, for instance, out of a population of 4,500 about 2,296 were infected.

Punjab.—The final forecast issued in September did not predict severe or widespread autumnal epidemics in the major part of the province. Moderately severe epidemic conditions were, however, expected to appear in the districts of Karnal, Sialkot, Hissar, Jullundur and Gurdaspur, whilst localised epidemic foci were forecast as probable in a considerable number of areas. The forecast proved to be reliable and it seems that a considerable degree of accuracy has now been attained in this piece of scientific prophecy. Of the 170,305 recorded deaths from malaria, 159,529 occurred in rural areas and 10,776 in towns, the death rates being 8 p.m. and 4 p.m.

Delhi.—As many as 117,451 cases of malaria, or 14 % of the total attendances were treated in hospitals and dispensaries. Deaths numbered 57; of these 11 were in rural areas. These figures do not give an accurate picture of actual facts; in many rural tracts malaria exists in severe form and the splenic index may be as high as 90 %. The worst affected areas lie to the east near the Jumna river and to the north where the land is irrigated by the Western Jumna Canal.

U. P.—Malaria in epidemic form existed in parts of 18 or 19 districts, but the outbreak was not widespread and in most areas was an accentuation of the usual autumnal wave. In all 5,272 villages were affected. An investigation carried out in regard to the reputed high malaria mortality in 35 municipalities showed that the reported figures were exaggerated, the percentage of error being over 36 %. Percentages of error as high as 57 % were discovered by similar investigations made in 30 districts. In the Sarda Canal "sample areas" and allied tracts, spleen rates of 100 % were found in the villages under canal irrigation in Shahjahanpur district. By contrast, the maximum spleen rate was 7·2 % in Unao district which is not irrigated by canals. Another investigation was carried out to ascertain the epidemiological features of malaria,

in villages along the Hardoi Branch of the Sarda Canal in the districts of Pilibhit and Shahjahanpur around Khanaut river. A spleen census was taken twice in the 30 districts under the district health scheme. Averages for the spring and autumn malaria seasons were only 3·3 % and 5·6 %. Nainital, Saharanpur and Mirzapur districts recorded high rates.

B. & O.—It is probably correct to say that malaria accounted directly or indirectly for most of the fever deaths. Whilst sporadic cases were reported from every part of the province, large portions of Orrisa and the districts of Singhbhum, Purnea, Muzaffarpur and North Bhagalpur are known to be intensely malarious. During 1935, a severe epidemic occurred in Madhipura and Supaul sub-divisions of Bhagalpur district, the numbers of cases reported being 14,108 and 33,548. This epidemic which started in September, reached its maximum in November and began to decline by the end of December, was confined to a low lying tract through which flows the Kosi river. Of the 11,247 children examined in 771 villages in the districts of Ranchi, Sambalpur, Angul, Cuttack, Singhbhum and Manbhum, 1,448 or 13 % were found with enlarged spleens; the spleen rates for these six districts were 7 %, 11 %, 27 %, 12 %, 14 % and 9 % respectively.

Bengal.—Recorded deaths totalled 342,955 giving a malaria death rate of 7 p.m. District death rates varied between 0·5 p.m. in Calcutta and 16 p.m. in Rajshahi. Other high rates were reported in Nadia (14 p.m.), Malda (12 p.m.), Rangpur (13 p.m.) and Dinajpur (12 p.m.) Rural areas returned 340,637 deaths and towns 2,318, the death rates being 7 p.m. and 1 p.m.

C. P.—No less than 269,249 deaths, or 50 % of the total provincial mortality, were ascribed to malaria; the death rate being as high as 17 p.m. The districts of Raipur, Bilaspur, Drug, Chhindwara, Hoshangabad, Saugor and Bhandara suffered most severely.

Bombay.—During the year, 31,221 malaria deaths were registered, giving a death rate of 1 p.m. The Central Registration District recorded 17,382; the Southern 6,821; the Northern 4,747 and Sind 2,175. 96 deaths from malaria were registered in Bombay city. The highest mortality was recorded in November and the lowest in June. Rural and urban death rates were 2 p.m. and 1 p.m.

Madras.—Malaria is more or less endemic in certain parts of East Godavari Agency, Vizagapatam, Ganjam and Kurnool districts. A preliminary survey of Bellary district revealed in 3 *taluks* a malaria mortality as high as in the "regional epidemics" of the Punjab and Sind and in the recent epidemic in Ceylon.

Assam.—Malarial fevers are the greatest scourge of this province. The disease was prevalent throughout and almost constantly in epidemic form. A total of 733,408 cases were treated in hospitals and dispensaries in the plains districts. Although deaths from malaria are not recorded separately, a very large percentage of the fever deaths are certainly attributable to malaria.

Burma.—The urban malaria death rate has shown a progressive improvement since 1928, the rate for 1935 being 0·03 p.m. less than that for 1934 and 0·21 p.m. below the 5-year mean. Towns recording high mortality include Lashio 19 p.m., Mawlaik 10 p.m. and Kawkareik 9 p.m. By comparing recorded "fevers" mortality in malarious districts with that in districts known to be practically free, it has been found that nearly 50% of the fever deaths may be ascribed to malaria. Generally speaking the wide open plains are free, but where the country gets broken up by low-lying hills malaria becomes prevalent and in those areas the highest morbidity and mortality are

found. Malaria broke out in epidemic form in Kyaukse district in November as a result of floods ; in Toungoo district the outbreak was mild ; whilst in the districts of Hanthawaddy and Insein malaria was constantly present. Severe malaria was reported from the Upper Chindwin district where in the narrow valleys the perennial hill streams provide favourable conditions for its development. As in previous years, the disease was very prevalent in the Shan States.

(c) *Anti-Malarial measures.*

N.-W. F. P.—The military medical authorities carried out extensive anti-malarial measures within and adjacent to cantonment areas. In the absence of properly trained staffs and anti-malarial organisations in municipal and notified areas, grants were made by Government and municipal councils to the military authorities in Peshawar and Kohat for anti-malarial measures to be carried out in the vicinity of the municipal areas and in villages near cantonments. Some municipalities carried out their anti-malarial measures within their own limits by draining pools, oiling water collections and so on. In rural areas, apart from treatment at local dispensaries and the distribution of quinine, no anti-malarial work of importance was attempted.

Delhi Province.—Measures included systematic weeding of water channels and flooded areas, spraying with paris-green and crude oil, use of oil mops, balls and bags in suitable places and drainage of stagnant water. Adult mosquitoes caught and identified included *A. stephensi*, *A. subpictus* and *A. culicifacies*. Of the local Government contribution of Rs. 5,000 for anti-malaria measures, Rs. 3,300 was utilised on oiling water collections during the malaria season.

U. P.—The Malaria Bureau under an A. D. P. H. continued to be maintained. Advanced courses of instruction in malariology including field work were given to 19 officers. A theoretical and practical course in malariology was given to 10 candidates for the License in Public Health, whilst 16 candidates went through a short training course designed for sanitary inspectors.

In the Banbassa headworks of the Sarda Canal, fortnightly examinations of blood films from fever cases were made in order to provide suitable treatment of chronic carriers. The usual " blanket " treatment was continued during the spring and autumn. In the Terai and Bhabar estates, 50 villages were paris-greened and 285 persons trained in antilarval work. Anti-malaria works, including clearing of drains, provision of suitable culverts, filling of depressions, etc., were carried out at a cost of Rs. 10,634. 10,874 boys were given a simple training in the causation and the principles of prevention of malaria at 33 urban and 127 rural centres ; their services were utilised for carrying out minor anti-mosquito measures. Anti-malarial byelaws were in force in 32 municipalities, cantonments and notified areas.

B. & O.—In the affected areas in Bhagalpur district, 8 doctors were temporarily employed and put in charge of field dispensaries. A field experiment to demonstrate the effect of paris-green on paddy crops was repeated in Puri district. The results were not conclusive and it was proposed to repeat the experiment.

Bengal.—The breeding of *A. ludlowii* in the neighbourhood of Calcutta was profuse as a result of the suspension of control operations in February when the Calcutta Corporation discontinued their contribution towards the cost of the control scheme in the Salt lake area.

C. P.—A travelling dispensary worked in the Melghat forest area and the adjoining *ryotwari* tract in Amraoti district. Anti-malarial operations were continued in Pachmari, Nagpur, Jubbulpore, Khandwa and Burhanpur.

Bombay.—The special staff of 54 subordinate medical service officers appointed during the malaria season visited 5,274 villages in the most malarious parts of the Presidency and treated 95,932 cases. Of the 125,954 children examined, 44,714 or 35 % were found to have enlarged spleens.

Madras.—Out of the Government of India grant for rural amelioration, a sum of Rs. 50,000 was sanctioned for anti-malaria operations in the districts of Vizagapatam Agency (Rs. 13,000), Nilgiris (Rs. 13,000), Chingleput and Nellore (Rs. 18,000) and in Ramesvaram Island (Rs. 6,000). General anti-mosquito campaigns were instituted in a number of municipal towns.

Coorg.—In addition to the anti-malarial officer, dispensary medical officers carried out anti-malarial measures within their respective areas. The co-operative societies, village *panchayats* and a number of planters also assisted with similar measures in rural areas.

Assam.—The Assam Government gave a grant of Rs. 25,000 to the Assam Medical Research Society for purposes of research and Rs. 24,500 for anti-malarial measures. Twenty candidates, including 9 officers of the Public Health Department, 4 of the Medical Department and 7 others, passed the eight weeks training course in malariology. Entomological investigations included the identification of 152,075 anophelines larvae and 22,997 adult specimens and dissections of 9,348 mosquitoes.

Specimens of *A. culifacies*, which has not been previously reported as a carrier, were found infected. 41 % of all blood slides examined, which came principally from hyper-endemic areas, showed malaria parasites. Data of 69,563 blood examinations from healthy, moderately endemic and hyper-endemic areas were being studied. Breeding experiments in the most northern and coldest parts have shown that under the coldest winter conditions the *A. minimus*, the principle vector of malaria, continues to emerge. Malaria researches with special reference to cold weather and premonsoon anti-larval control have shown that the suitability of breeding conditions of *A. minimus* during the period January to June is the responsible factor for the increase in the malaria case incidence in moderately endemic areas and that, in the hyperendemic areas, breeding during this period is conducive to rapid geometric progression in numbers of adults so that, when rains breeding places are made available, breeding is transferred to these places and continues till November. Anti-malarial measures were carried out in nearly all districts.

Burma.—Anti-malarial measures comprised reclamation of borrow pits and tanks, filling of depressions, grading of drains, paris-greening and oiling. Byelaws regulating the collection and storage of water and prevention of the breeding of mosquitoes were sanctioned by Government for Maymyo. A staff of 14 inspectors was employed by Rangoon Corporation in order to carry out an intensive campaign against mosquito breeding.

From the Government of India grant of Rs. 5 lakhs for rural uplift, a sum of Rs. 1,15,000 was allotted for an anti-malaria scheme. This included Rs. 25,000 for the breeding and distribution of larvivorous fish. Rural water supplies which are derived mainly from tanks offer opportunities for prolific breeding.

(d) *Quinine.*

Botanical Survey of India.—Burma plantations yielded 81,772 lbs. of bark as against 64,429 lbs. in 1934-35. Of this 75,569 lbs. were sent to the Mungpoo factory and the plantations stock at the end of 1935-36 amounted to 92,511 lbs. The Mungpoo factory treated a total of 73,078 lbs. of bark (Java 23,341 lbs. and Burma 49,737 lbs.), yielding 2,820 lbs. of quinine sulphate and 1,379 lbs. of cinchona febrifuge. The recrystallisation of crude quinine to trade quinine of B. P. standard was continued and 17,230 lbs. were produced.

Quinine amounting to 45,000 lbs. was distributed free to various provinces and administrations, in pursuance of the Government of India's policy to liquidate part of their surplus stocks. The balance of stocks at the end of the year amounted to 157,870 lbs.

Sales included quinine sulphate (all forms) 30,148 lbs. ; quinine sulphate tablets 1,222 lbs. ; quinine reinforced cinchona tablets 1,764 lbs. ; cinchona febrifuge tablets 155 lbs.; and cinchona febrifuge powder 4,533 lbs.

Table II (iii) gives in lbs. total quantities in stock, manufactured and issued during 1935-36.

TABLE II (*iii*).

	In stock on 1-4-35.	Manufactured.	Total.	Sold or issued otherwise.	Balance.
	lbs.	lbs.	lbs.	lbs.	lbs.
Quinine Sulphate . .	235,866	22,900	258,766	100,896	157,870
„ Sulphate tablets .	899	1,194	2,093	1,225	868
„ reinforced cinchona tablets . . .	319	1,484	1,803	1,764	39
Cinchona febrifuge tablets .	..	383	383	155	228
Cinchona febrifuge . .	19,687	1,800	21,487	6,250	15,237

Government Cinchona Plantations and Factory in Bengal.—The dry bark harvest at Mungpoo was 457,507 lbs. ; ledgeriana 386,428 lbs., succirubra 22,928 lbs. and hybrid 48,151 lbs. That at Mungsong was 871,795 lbs., including ledgeriana 797,848 lbs.; officinalis 14,662 lbs. ; succirubra 10,601 lbs.; and hybrid 48,648 lbs. Of this total, 200,000 lbs. were sold to the Madras Government and 3,360 lbs. to a Calcutta firm for experimental purposes, leaving a balance of 683,133 lbs. in the factory. Altogether 1,361,941 lbs. were utilised in the factory. Table II (*iv*) gives details of the manufacture and disposal of factory products.

TABLE II (*iv*).

	Balance on 1-4-35.	Manufactured.	Returned to stock.	Total.	Issued or sold.	Converted to other products.	Balance on 31-3-36.
Quinine sulphate powder (purified) . . .	5,659	29,144	41	34,844	15,012	13,362	6,470
Quinine sulphate crude .	153,339	21,597	...	174,936	25,812	...	149,124
Other quinine salts . .	181	972	1	1,154	905	...	249
Quinidine sulphate tablets .	1,322	4,200	2	5,524	4,283	...	1,241
Cinchonine salts . .	37	5	...	42	6	...	36
Cinchonidine salts . .	39	17	...	56	12	...	44
Quinidine	53	130	...	183	128	...	55
Cinchona febrifuge powder .	609	23,343	18	23,970	16,896	5,177	1,897
Cinchona febrifuge tablets .	599	4,360	103	5,062	4,471	...	591
Quinine sulphate tablets (in treatments) . .	17,538	82,527	4,019	104,084	85,895	...	18,188
Quinine alkaloid . .	48	465	...	513	416	...	97
Totaquina . . .	559	1,854	54	1,967	1,427	...	540

Madras Government Cinchona Department.—A total of 495,098 lbs. of cinchona bark costing Rs. 2,06,880 was used in the manufacture of quinine products ; 4,46,820 lbs. of bark remained in the factory on 31st March, 1936. The limit of stock of quinine sulphate fixed by Government was raised to 25,000 lbs. The Naduvatam factory produced 9,760 lbs. of quinine sulphate, 3,749·5 lbs. of quinine sulphate tablets, 1,254 lbs. of quinine hydrochloride, 1,308 lbs. of quinine bi-hydrochloride, 3,345 lbs. of cinchona febrifuge, 2·5 lbs. of cinchona febrifuge tablets and 5,982·5 lbs. of totaquina.

The total quantities in lbs. of quinine and cinchona febrifuge issued are given in Table II (v) on page 40.

Table II (*vi*) gives the amounts in lbs. of quinine, cinchona febrifuge and totaquina issued free or sold from all sources during 1935.

TABLE II (*vi*).

	Free.			Sold.		
	Quinine. lbs.	Cinchona. lbs.	Tota-quina. lbs.	Quinine. lbs.	Cinchona. lbs.	Tota-quina. lbs.
Total	**25,535**	**21,839**	**552**	**10,725**	**3,906**	**2,613**
N.-W. F. P.	1,617	737	..	..	..	..
Punjab	944	416	..	*2,084*	..	..
Delhi	361	179	..	..	..	..
U. P.	2,588	3,140	..	1,105	1,034	..
B. & O.	..	..	..	317	..	..
Bengal	13,409	13,606	..	..	..	..
C. P.	1,049	655	7 ozs.	466	21	..
Bombay	2,518	7	..	2,277	..	..
Madras	944	310	510	4,398	433	2,613
Coorg	460	279	42	28	..	..
Assam	1,558	2,222	..	50	231	..
Burma	..	257	..	..	2,187	..
Ajmer-Merwara	87	31	..	..	..	..

*For the year 1935-36.

Although these figures are taken from official returns, they do not give a correct representation of the quantitites of quinine consumed in the country. One thing is certain ; the people of India do not consume more than a fraction of the quinine which they require. At the same time, it is by no means easy to give even a rough approximation of the potential demand. More than one authority has estimated that at least 100,000,000 persons suffer from malaria every year. For the purpose of mass treatment the amount of quinine should be the minimum effective dose which will relieve symptoms. Taking this at 45 grains, a rough estimate of the annual quinine requirements for India would be 100,000,000 × 45 grains or approximately 600,000 lbs. Again, if we accept the estimate that 30 % of the population in India suffers from malaria, then this country requires yearly some 24 million ounces of quinine or 1,250,000 lbs. The potential annual demand probably lies somewhere between these two figures, but, whichever is accepted, it makes a remarkable contrast with the present annual consumption in India which for several years past has remained remarkably steady at about 200,000 lbs. The present consumption is therefore only about one-third of the lower figure for estimated requirements and it is less than one-sixth of the higher figure.

TABLE II (*v*).

Quinine Salts issued during the year, 1935-36.

	Quinine sulphate.	Cinchona febrifuge.	Cinchona febrifuge. tablets.	Quinine sulphate tablets.	Quinine hydro-chloride.	Quinine bi-hydro-chloride.	Quinine bisulphate and tablets.	Totaquina and tablets.	Cinchona bark.
Total .	17,503	8,723	638	1,547	460	1,222	135	4,158	1,424
Government hospitals . .	1,049	125	..	947	4	5	..	1,184	..
Local fund medl. institutions .	1,223	231	3	156	..	..	1	1,103	..
Municipal medical institutions .	375	27	..	..	..	..	..	175	..
Medical Store Depots—									
Madras	1,050	..	..	..	24	592	..	220	800
Bombay	4,560	..	..	..	390	550	..	600	400
Burma	2,500	2,450	..	..	2	75	..	..	..
Central Provinces . . .	2,580	800	..	..	40	..	..	..	..
Coorg	189	146	133	286	..	..	..	42	..
M. & S. M. Railway . . .	110	30	230	..	..	..	..	..	..
Public	310	2,053	147	..	..	..	..	15	..
Local sales . . .	17	1,711	20	8	..	..	134	819	..
Indian States—									
Hyderabad . . .	130	200	100	25	..	..	..	..	..
Mysore	118	600	..	..	..	..	..	..	..
Baroda	1,407	50	..	..	..	..	..	..	..
Travancore . . .	1,825	..	..	100	..	..	..	..	..
Central India . . .	60	300	5	25	..	..	..	..	224

The question of increasing the popularity of quinine has engaged the attention of the Government of India and a number of Provincial Governments at different times, but these attempts have at no time been particularly successful. In considering the question of popularising the use of this drug, it must be remembered that it is necessary not only to educate the people in regard to its value but to evolve cheap and effective methods for its distribution. The first thing that is required is a properly organised advertising and selling campaign extended to the remotest parts of the country and this might well be associated with a plan for the general quininisation of school children with one of the cheaper forms of the drug. One of the main obstacles to effecting a wide dissemination of anti-malarial drugs is in organising a suitable agency for distribution. Existing agencies include post offices, public health departments and voluntary organisations, but at all times effective distribution is an expensive procedure and in any attempt to popularise the use of quinine every effort must be directed to the formulation of means whereby cheaper methods of distribution can be effected. Apart from distribution, however, the greatest difficulty has been to place the drug at the disposal of the villager at a price which he can afford to pay. Propaganda, although ordinarily of value, must largely fail if the advertised drug is beyond the villager's financial resources. The question of price is therefore intimately associated with that of propaganda campaigns and the two cannot be considered separately.

During the year the Government of India made a free gift of 45,000 lbs. of quinine to the provinces. This was distributed as follows :—U. P. 6,000 lbs. ; B. & O. 6,000 lbs. ; Burma 5,000 lbs. ; Assam 4,500 lbs. ; Bombay 4,000 lbs. ; Madras 4,000 lbs. ; C. P. 3,500 lbs. ; N.-W. F. P., Delhi and Baluchistan 1,250 lbs. each ; Coorg 750 lbs. ; Ajmer-Merwara 250 lbs. and the Andamans 250 lbs.

N.-W. F. P.—Special compounders distributed quinine in the villages of Peshawar district.

Punjab.—In addition to a small amount issued free, 943 lbs. of quinine and 416 lbs. of cinchona febrifuge were distributed in rural areas by the public health staff through the agency of 606 depots and 3,689 sub-depots.

Delhi.—Of the local Government grant of Rs. 5,000 for anti-malarial measures, Rs. 1,700 was utilised for the distribution of quinine through members of the district board, school staffs and dispensary medical officers. 361 lbs. of quinine and 179 lbs. of cinchona were used in Government hospitals, dispensaries, jails, etc.

U. P.—Altogether 1,105 lbs. of quinine and 1,034 lbs. of cinchona were sold and 117 lbs. of quinine powder from the D. P. H.'s reserve stock, etc., were converted into tablets at the Government Quinine Factory. Twenty-one lbs. of quinine and 152 lbs. of cinchona tablets were issued to replenish reserve stocks in ten districts for distribution during malaria epidemics. In addition, a scheme for the distribution of the Government of India's gift of 6,000 lbs. in the rural areas was under consideration.

The usual " blanket " treatment was given to the whole population as well as to all newcomers in spring and autumn in the Banbassa-headworks of the Sarda Canal. 125 lbs. of quinine, 132 lbs. of cinchona and 4,985 tablets of plasmoquine were distributed free during the malarious season in certain villages not served by dispensaries in the Terai and Bhabar Estates. Encouraging results were obtained from intensive mass treatment in 36 villages through the agency of two travelling compounders. In rural areas suffering from epidemic malaria, 488 lbs. of quinine and cinchona were distributed free by the

P. H. Department. 1,146 lbs. of quinine and 1,769 lbs. of cinchona were used in hospitals and dispensaries and mass treatment with cinchona and plasmoquine was continued in parts of Lucknow, Hardoi, and Unao districts. Five lbs. of cinchona and 4,378 tablets of plasmoquine were given free to scholars in Kosi, 3 lbs. and 2,773 tablets in Brindaban, 8 lbs. of cinchona in Budaun and 3 lbs. in Khurja. The Shahjahanpur Rural Uplift Association distributed 22 lbs. of cinchona ; and the *Taraqi Sabha*, Pilibhit, 8 lbs. of cinchona. With all this activity, the total annual distribution of quinine and cinchona per head of the population in some districts was as low as 0·02 grains and the maximum was only 16·34 grains per head. These figures throw a lurid light on the inadequacy of the quinine campaign against malaria as it exists at present.

B. & O.—Quinine requirements are obtained through the Presidency jail at Calcutta. " Treatments " each consisting of 20 tablets of 4 grains and packed in small tubes are sold at post offices at five annas three pies. By this means 316·9 lbs. of quinine sulphate were sold in six districts.

Bengal.—Sales of quinine through post offices aggregated 7,781 lbs., but this amounted only to one grain per head of the population. The scheme of giving 80 grains of quinine and 3 tablets of 0·02 grammes of plasmochin to the whole population of 21,400 in 100 villages in a hyperendemic part of Burdwan district was continued. In addition to six doctors in charge of 30 treatment centres, 88 volunteers were entrusted with distribution of the drugs. A reduction of 61 % in the malarial incidence was recorded as against 34 % in the control area. Similarly the spleen index of children under 12 years was 31 % as compared with 65 % in the control area.

C. P.—During the year, 2,580 lbs. of quinine sulphate, 800 lbs. of cinchona febrifuge and 40 lbs. of quinine hydrochloride were purchased at a cost of Rs. 59,641 and were manufactured into tablets in the Nagpur jail factory. Sales amounted to lbs. 3,572. Free distribution of quinine was continued in the hyperendemic areas of four districts. The Public Health Department distributed free about 31 lbs. of the drug, whilst arrangements were made for the free distribution of the Government of India gift of 3,500 lbs. in hyperendemic areas.

Bombay.—Government sanctioned the free distribution of quinine sulphate costing Rs. 26,000 ; an equal amount for sale in post offices ; and quinine hydrochloride costing Rs. 8,719 for sale in treatment packets. Quinine costing Rs. 42,360, was distributed through revenue and other officials and administrative officers of district board schools. The Yeravda jail sold quinine to the value of Rs. 37,060. The amounts of quinine distributed included 662,800 five-grain and 1,124,980 two-grain tablets in Sind ; 340,050 five-grain and 326,550 two-grain tablets in the Southern Registration District ; 157,996 and 135,006 in the Central Registration District ; and 243,480 and 329,425 in the Northern Registration District.

Madras.—Free distribution of quinine was continued in 13 districts and was further practised in parts of Madura and Trichinopoly districts. About 1,500 lbs. of quinine were used for the treatment of 115,000 persons out of a total of over 1½ million included in the scheme. In addition, 1,500 lbs. were sold at reduced rates.

Coorg.—In addition to the usual public health grant for free distribution of quinine, one-third of the Government of India gift of 750 lbs. was utilised. School children found with enlarged spleens were regularly treated with quinine

during the malarial season. The " blanket " prophylactic and curative treatment with atebrin and plasmoquine was carried out at Fraserpet.

Assam.—Re-inforced cinchona febrifuge continued to be used as a preventive and curative agent and was sold at the cost price of 3¾ annas per treatment. Experience has shown that the present treatment of 80 grains (three parts cinchona febrifuge and 1 part quinine sulphate) is insufficient to effect a complete cure, *i.e.*, to bring about the complete disappearance of parasites, although the amount of quinine is more than ample for the subsidence of fever. In order to popularise the use of this preparation, Government have approved the issue of similar treatments containing 10 tablets of 4 grains each at 2 annas. Of the 10,579 treatment parcels sold, the district of Sylhet took 2,599, Kamrup 1,490, Nowgong 1,058 and Lushai Hills 1,152. In addition, 184 lbs. of quinine sulphate and 466 lbs. of cinchona were obtained for free distribution and 4,500 lbs. of quinine were received as a free gift from the Government of India.

Burma.—Cinchona febrifuge tablets continued to be manufactured in the Rangoon jail. A total of 3,826,980 tablets were sold and 448,560 tablets were distributed free in 16 districts. Of the Government of India grant for rural reconstruction, Rs. 1,15,000 was earmarked for anti-malarial measures. A free gift of lbs. 5,000 was received from the Government of India. The average annual consumption of cinchona febrifuge per head of population rose from 0·87 grain in 1933 to 1 grain in 1934 and 1·2 in 1935.

Dysentery and diarrhoea.

18. Compared with 1934, total deaths decreased slightly to 279,223 giving a death rate of 1 p. m. As the recorded figures indicate, in every province these diseases continued to be much more prevalent among towns people than among villagers ; for instance, the urban death rate in Madras Presidency was 2·6 times the rural rate ; in Bengal it was twice as high; and in Ajmer-Merwara 3½ times as high. The higher prevalence in urban areas, many of which have protected water supplies and comparatively satisfactory marketing arrangements, offers a problem for serious investigation. In this connection, the D. P. H., Punjab, remarks :—

" It emphasises once again the fact that unless appreciable improvements are affected in the conservancy system of towns and the people begin to feel keen on keeping themselves and their surroundings clean and live in healthier environments, the prevalence of the disease cannot be mitigated."

The fact that nearly 88,000 deaths were recorded in the months of August to September suggest that the monsoon rainfall and the consequent contamination of water supplies have considerable influence on the incidence of these diseases.

Tables J and K in Appendix II on page 232 give details of recorded deaths and death rates.

In *Assam* the death rate was 1 p. m. The maximum mortality was recorded in May and the minimum in February. Bacteriophage had been largely used in Nowgong district since December, 1929, but the results were not very striking. In the *U. P.*, the highest mortality occurred in May and June and the lowest in January ; the death rate was 0·4 p. m. In *B. & O.* the death rate (0·5 p. m.) was lower, but Orissa division again recorded 78 % of the total recorded deaths. It is stated that the high prevalence of these diseases in *Orissa* is associated with climatic conditions, bad water supplies and defective sanitation. In *Bengal*, the hill district of Darjeeling recorded

the high death rate of 4 p. m. ; in Howrah it was 3·5 p. m. ; in Calcutta 2·3 p. m. ; and in Hooghly 1·9 p. m. In the *Punjab*, high death rates continued to be recorded in the districts of Kangra (3·4 p. m.), Rawalpindi (3 p. m.) and Simla (1·2 p. m.). In the *C. P.* and *Berar*, the prevalence of these diseases is attributed to bad conservancy, ineffective disposal of night-soil, the prevalence of flies and bad water supplies. Their incidence is greatest in areas where water supplies are obtained from wells. In the *Bombay and Madras Presidencies*, the highest mortality occurred in August and the lowest in February.

Enteric Fever.

19. In regard to this disease, the D. P. H., Burma, writes :—

" As the diagnosis of this disease is so often dependent on accurate bacteriological examination it is believed that the total of 315 deaths recorded during the year falls short of the true mortality. Blood specimens for culture are taken by medical practitioners in only the minority of fever cases and for that reason many enteric infections are probably missed. Other factors against the detection of enteric cases are the remote chances of isolating the organism from the blood after the first week of the disease and the fact that patients frequently wait for an appreciable time before calling in a medical man."

The D. P. H., Bombay also remarks that :—

" Enteric fever is increasing in the Presidency, the increase is due partially to better diognosis of the disease but sharp outbreaks in several localities show the need of systematic investigation."

These remarks apply equally to the other provinces of India. There seems little reason to doubt that the enteric fevers have a high incidence both in the urban and rural areas of this country and it is probably correct to say that a considerable percentage of those below 18 years of age have already passed through an attack, whilst many of the recorded ' fevers ' deaths are caused by those infections. Under present circumstances, it is impossible to differentiate deaths caused by enteric from other fevers except in the few cases which may be treated in hospitals or are seen by qualified practitioners. The recorded statistics in most provinces, therefore, give a very incomplete picture of actual facts and most of the figures which follow should be considered in the light of these remarks.

In Delhi city, a severe epidemic of enteric caused no less than 588 deaths out of a total of 599 recorded in Delhi Province. It is probable that similar figures will be returned by Delhi, until existing insanitary conditions in that city are abolished. Whilst in the U.P. recorded enteric deaths numbered 8,578, the verification of deaths in certain areas suggested that no less than 24,686 persons died of this disease. Other recorded provincial figures are :—N.-W. F. P. 186 deaths ; Punjab 7,318 ; Bengal 8,709 ; C. P. 6,014 ; Bombay 7,041 and Madras 1,612.

Respiratory Diseases.

20. *N.-W. F. P.*—Recorded deaths numbered 2,822 (1 p. m.). In the districts of Kohat and Peshawar, the rate was 1·5 p. m. The largest mortality occurred in January.

Punjab.—The mortality increased from 55,570 to 58,800 owing to a more severe winter. The death rate was 2 p. m., whilst the urban death rate was 5 p. m. as compared with a rural rate of 2 p. m.

Delhi.—The rural and urban death rates were very similar *viz.* 5·6 and 5·3 p. m. Deaths totalled 2,311 in towns and 1,109 in rural areas.

U. P.—A total of 46,270 deaths (0·9 p. m.) was recorded. The maximum mortality was recorded in May and the minimum in July. The death rate

was high in the districts of Hamirpur (5 p. m.) and Lucknow (5 p. m.). Bhowali town (Nainital) reported the high death rate of 24 p. m. ; Cawnpore 22 p. m. and Hathras 17 p. m. Some investigation of registration methods in these towns seems called for, as the recorded rates are incredibly high.

B. & O.—Of the 7,148 recorded deaths, (0·2 p. m.), 869 were recorded in urban and 6,279 in rural areas with death rates of 0·6 p. m. and 0·2 p. m.

Bengal.—Recorded deaths totalled 84,868, giving a death rate of 2 p. m. The highest mortality was recorded in December and the lowest in June. Compared with 1934, this death rate in towns decreased by 6% and in rural areas by 12%. Calcutta city alone recorded 9,514 deaths from this cause.

C. P.—Deaths numbered 39,462 with a death rate of 3 p. m., 34,106 in rural and 5,356 in urban areas. The death rate was highest in September and lowest in July.

Bombay.—Recorded deaths again increased to 115,262, males 62,796 and females 52,466. The death rate was 5·3 p. m. The urban rate of 8·6 p. m. greatly exceeded the rural rate of 4·5 p. m.

Madras.—Although the number of deaths decreased to 102,843, the death rate being 2·3 p. m., the recorded mortality from this cause was still 9% of the provincial total. The death rate was highest in December and lowest in April. The urban mortality (4 p. m.) was double the rural (2 p. m.). Madras city recorded the high rate of 12 p. m. The conclusions reached in the " High mortality " Report written several years ago seem to be still applicable.

Assam.—The death rate was 0·9 p. m. Lakhimpur district recorded the high rate of 2·3 p. m. The highest and lowest incidences were recorded in November and February.

Burma.—Deaths totalled 11,954, giving a death rate of 1 p. m. The city of Rangoon recorded a death rate of 8 p. m. ; other high rates were Mandalay district (3 p. m.) and Lower Chindwin (3 p. m.). There were 146 male deaths for every 100 female. The urban death rate was 6 p. m. and rural rate 0·3 p. m.

Pneumonia.

21. *N.-W. F. P.*—Deaths totalled 604 in 7 municipalities with an average death rate of 2 p. m.

Punjab.—A total of 21,941 deaths were reported, 5,752 in towns and 16,189 in rural areas. The death rate was 0·9 p. m., urban 2 p. m., rural 0·8 p. m.

Delhi.—There were 1,248 deaths giving a death rate of 2 p. m. Of the total 961 occurred in towns and 287 in rural areas, the rates being 2 p. m. and 1 p. m. respectively.

U. P.—A total of 16,454 deaths gave a death rate of 0·3 p. m. The urban rate was 3 p. m. and the rural 0·01 p. m.

B. & O.—Only 49 deaths were recorded in municipalities, of which 26 were in Patna city.

Bengal.—The incidence of pneumonia has been on the increase since 1923, mainly in rural areas. Deaths totalled 41,938 with a rate of 0·8 p. m. Rural areas reported 36,163 deaths and towns 5,775. Of the latter, 2,375 occurred in Calcutta alone.

Bombay.—A total of 26,292 deaths was recorded, giving a death rate of 1·2 p. m. The rural rate was 0·6 p. m. and the urban 4 p. m.

Madras.—Deaths in municipalities numbered 6,164.

Assam.—266 deaths were registered in 13 larger towns.

Burma.—Urban areas reported 3,880 deaths, with a death rate of 3 p. m.

Tuberculosis.

(*a*) *General.*

22. The distribution and incidence of infectious disease in India always present complex epidemiological problems because of the variations in the etiological factors which are to be met with in different parts of the country and in different groups of the population. In no instance is this more true than in the case of infection with the tubercle bacillus. Tuberculosis, particularly in its pulmonary form, has markedly increased during the last three decades especially in the large urban and industrial areas. Only within recent years, however, has the infection begun to spread to the rural villages, this extension of infection being partly caused by the return of infected industrial workers, students, etc., to their ancestral homes and partly to the great development of rapid transport facilities. Some hold that the present degree of tuberculisation of the people of India lies midway between that of the virgin African races and the highly urbanised and industrialised European peoples, but whatever may be the extent of infection in that part of the Indian population which lives in towns and industrial areas, there seems little doubt that the reaction of the ordinary rural population to infection with the tubercle bacillus is such as is usually associated with primitive races.

In other words, once infection is introduced into the rural villages, it is almost certain to spread rapidly and to cause a heavy morbidity and mortality. This fact has recently been illustrated in striking degree. The Gurkhas who come from the remote state of Nepal show in comparison with other men of the Indian army a much higher susceptibility to and mortality from tuberculosis. These gallant little soldiers, in other words, are from the tuberculisation point of view members of a primitive race and being completely non-immunised are unable to resist an infection which often proves rapidly fatal. This is to a large extent the position of the great mass of the rural populations of India at the present time and as there are ominous signs that infection is spreading to and through these rural areas, the time has come when preventive campaigns should be extended to include these areas.

It is difficult to estimate with any degree of exactitude morbidity and mortality rates of tuberculosis in rural areas, as few cases are ever seen by a medical officer and registration lies in the hands of petty village officials who are not competent to arrive at the correct cause of death. The only possible method of making an estimate is to take a proportion of the deaths recorded under such headings as ' fevers ' and respiratory diseases. It has been variously calculated that from 10-20 % of the former group and 20 % of the latter are actually due to pulmonary tuberculosis and, in some such unsatisfactory fashion, tentative figures may be prepared.

In respect of the rural population, little information of a more exact nature is available, although a few small surveys have been carried out during recent years in certain urban areas. Similar surveys for sample rural areas will have to be made before preventive campaigns in any province can be suitably planned. One example may be cited ; it has been reported that the district of Darjeeling, which is mainly rural and is by no means industrialised, has a tuberculosis death rate second only to Calcutta city in the whole province of Bengal. If this be correct, the position is serious and demands immediate attention. But until verification has been made by careful survey and until

similar sample surveys are made in every district it will be difficult to plan effective preventive work. Although in the ordinary village, houses may be reasonably spaced out, overcrowding in individual houses often exists to a marked degree, while other factors such as the joint family system, early marriage, the *purdah* system, etc., are common to both urban and rural population and tend to favour dissemination of infection once it is introduced within the household. Investigations have already shown that in 50 % of the cases there is a history of contact with another case in the family and, when a system of home visiting of patients is developed, a much higher percentage of contact cases will almost certainly be made evident.

It is worth noting that infection with the bovine bacillus is still a rare occurrence in India. This is no doubt partly due to the fact that very few of the cattle are infected with bovine tuberculosis and partly because milk is almost invariably boiled before it is used. Investigations made in Bombay and Calcutta in regard to the typing of tubercle bacilli obtained from non-pulmonary sources have corroborated the belief that bovine tuberculosis is uncommon.

Although India has not yet planned a national campaign against tuberculosis and few special tuberculosis workers are to be found either in urban or rural areas, there are in existence a number of Tuberculosis Associations in various parts of the country. The King George Thanksgiving (Anti-Tuberculosis) Fund, affiliated to the Red Cross Society, has for some years carried on an active educative campaign and has done what it could with the small funds at its disposal to co-ordinate anti-tuberculosis activities in the different provinces and to assist with grants different forms of preventive work. In some instances, voluntary Tuberculosis Associations have opened tuberculosis clinics to which medical officers, nurses and home visitors are attached and these have done and are doing very valuable pioneer work. But in order to meet the situation, much larger financial resources are essential, a large number of specially trained medical officers, nurses and home visitors are required and the object should be to have at least one special tuberculosis clinic in every municipality and rural town where skilled treatment and advice would be available to all. Like all other public health activities, this requires ample funds, but the danger to the population is so great that the financial side of the question should not be allowed to act as a deterrent but should rather be an incentive to overcome the difficulties.

Once the country is equipped with a chain of tuberculosis clinics it will be possible to arrive at a more accurate estimate of the incidence of the disease and of the needs of the sufferers. The work of the clinics will also indicate the extent to which hospital and sanatoria beds are required. At the present moment, the total beds reserved for tuberculosis patients number only a few hundreds. It will never perhaps be possible to provide a sufficient number of beds to accommodate the hundreds of thousands of tuberculosis patients in the country, but this is not a difficulty which need daunt those interested in the prevention of the disease because other methods can be successfully practised. That is not to deny that additional hospital and other beds are necessary; all that it is intended to imply is that these are not the first requirements for an anti-tuberculosis campaign.

The 13th Conference of Medical Research Workers held at Calcutta in November/December, 1935, passed the following resolution :—

"This Conference reaffirms Resolution No. 16 of 1934 and notes with regret that so little work has been done in the domain of tuberculosis research in India. It further recommends that provincial authorities be urged to carry out accurate tuberculosis surveys in their respective areas and, if possible, to communicate such results as may be obtained for discussion at the Conference."

Tuberculosis surveys have not been attempted in any province, except in restricted areas in a number of towns. These include Ranchi in B. & O. 1929-30 ; Ahmedabad, Ahmednagar and Panchgani in Bombay Presidency in 1930, 1931 and 1936 ; Nagpur city in Central Provinces in 1932 ; and Lahore in the Punjab in 1932-34.

The survey of Ranchi town was carried out by means of house to house visits and 360 cases of phthisis were discovered after clinical examination. The disease was found to be prevalent more or less throughout the town but the more overcrowded insanitary, dusty and poorer localities were chiefly affected. The disease was found more prevalent among the poor than among the well-to-do, but the fact that Ranchi is a health resort probably had something to do with the high incidence. Many cases were found among the aborigines who were previously believed to be practically un-infected. Infection was traced to extraneous sources such as coal miners and tea garden workers. A high incidence was found among Muhammadan females holding to the *purdah* system and in the villages lying around Ranchi the infection was also found to be spreading.

As regards Panchgani, its climate makes it a resort for tuberculous persons. The investigation included the study of morbidity and mortality among children of consumptive mothers, consorts of consumptives and those whose work lay amongst consumptives. Infection in the first group was found almost universal ; in the second group the incidence was slightly higher than normal and in the third group the incidence was not higher than in the general population.

In Nagpur city the survey covered 1,490 houses with a population of 2,939 adult males, 2,827 adult females and 2,521 children under 12 years. 83 cases of active tuberculosis and 68 " doubtful " cases were discovered. The former group comprised 48 pulmonary cases, 6 abdominal cases, 6 cases of bones and joints, and 23 others. Of the pulmonary group, 40 were males and 9 females and of the non-pulmonary group 22 and 12 respectively.

The survey of Lahore town which was carried out under the auspices of the Anti-tuberculosis Fund of the I. R. C. S., was discussed in last year's report.

(*b*) *Provincial.*

N.-W. F. P.—The numbers of cases treated in hospitals and dispensaries have increased as follows :—3,110 in 1930, 5,707 in 1933, 6,429 in 1934 and 8,438 in 1935. These figures are alarming and indicate the necessity for a well-planned anti-tuberculosis campaign. Registered deaths from pulmonary tuberculosis numbered 315 in six municipal towns with rates varying from 0·2 to 1·7 p. m. An anti-tuberculosis committee has been formed and T. B. clinics have been established at 27 hospitals : 3 in Hazara district, 6 in Peshawar, 5 in Mardan sub-division, 3 each in Bannu and D. I. Khan, 2 each in North and South Waziristan, and one each in Kohat, Malakand and Chitral.

Punjab.—During the year 10,170 deaths from phthisis were recorded, 8,269 in rural and 1,901 in urban areas. Steps were taken to enforce certification of deaths in the area surveyed in Mozang in order to assess the death rate from tuberculosis and the degree to which notification of the disease was practised. A sanatorium providing for 46 beds has been opened at Samli in Rawalpindi district under the auspices of the Indian Red Cross Society.

Delhi.—A total of 1,013 deaths, giving a death rate of 1·6 p. m. were ascribed to pulmonary tuberculosis. Of these, 925 occurred in urban areas

and 88 in rural areas. The female death rate was double that for males. Mortality by sex and community is tabulated below :—

	Deaths.			Rate *per mille*.		
	M.	F.	Total.	M.	F.	Total.
All classes . . .	383	630	1,013	1·0	2·2	1·5
Hindus . . .	243	386	629	1·0	2·0	1·5
Muhammedans . .	138	241	379	1·0	2·6	1·7
Christians . . .	2	3	5	0·2	0·4	0·3

Delhi city has now been provided with a tuberculosis clinic and dispensary and a hospital with 68 beds.

U. P.—Phthisis was the cause of 7,325 deaths, or nearly 23% more than in 1934, the increase being recorded entirely in urban areas. Bhowali town returned a death rate of 24 p. m., but this does not necessarily mean that the incidence of tuberculosis in this town is high because a sanatorium exists within its limits which houses tuberculosis patients from all over the province. Other high urban death rates were 5·6 p. m. in Sikandra Rao, 4·6 p. m. in Cawnpore and 4·1 p. m. each in Dankar and Moradabad.

B. & O.—The problem of tuberculosis in Orissa is said to be less acute than that of leprosy, malaria, cholera and smallpox. This may be so because of the lack of industrial development in this part of the province.

Bengal.—Phthisis was the cause of 16,524 (0·3 p. m.) deaths including 12,373 (0·3 p. m.) in rural and 4,151 (1·2 p. m.) in urban areas. Calcutta alone recorded 2,856 deaths (2·5 p. m.). Darjeeling (1·5 p. m.) recorded the highest district rate.

C. P.—It has been recognised for some time that tuberculosis is a serious menace. With funds provided by the provincial Government and the Silver Jubilee Fund, tuberculosis clinics have recently been established at Nagpur, Jubbulpore, Amraoti and Raipur.

Bombay.—Deaths ascribed to phthisis totalled 24,778, giving a death rate of 1 p. m. Measures for combating the increasing prevalence of this disease were under consideration. These included notification at least in the larger towns. The urban death rate (2 p. m.) was as usual higher than the rural (1 p. m.). In rural areas, the incidence continued to be high in the Konkan.

A total of 909 tuberculous cases were treated in the Karachi Municipal tuberculosis dispensary. The two health visitors attached to the dispensary visited 23,790 houses and detected 541 cases. In Hyderabad town, 1,261 cases were treated in the K. T. tuberculosis dispensary. The health visitor in charge of the anti-tuberculosis centre in Shikarpur town gave lectures and demonstrations in schools and other institutions.

Madras.—A total of 77,412 cases, of which 1,413 died, were treated in hospitals and dispensaries. No statistics are available of the deaths from pulmonary tuberculosis in rural towns and villages, but a careful analysis of the recorded deaths in 15 municipalities disclosed that 2,436 deaths, or 6·5% of the total, were due to tuberculosis of lungs. Observation of the employees of the Government Press was continued at the Madras Tuberculosis Institute. That Institute now serves as a centre for the after-treatment of cases discharged from hospitals and sanatoria.

Assam.—It is reported that tuberculosis is on the increase.

Burma.—Insanitary and overcrowded housing conditions and the low standard of environmental sanitation which characterise urban life militate against any improvement in the tuberculosis position. The recorded death rate from pulmonary tuberculosis was 15 times higher than that of 1934 but this sudden great increase has no doubt resulted from improved registration. The general urban death rate was 2 p. m., the range of variation in individual towns being 4 p. m. in Thamaing and 2 p. m. in Rangoon. A tuberculosis dispensary under a trained medical officer was opened in Rangoon. The need for a sanatorium in the province is said to be acute.

Ajmer-Merwara.—Deaths from tuberculosis in Ajmer city and its suburbs numbered 678 as against 352 in 1934.

Beri-beri and Epidemic Dropsy.

23. Cases of beri-beri treated in hospitals and dispensaries in the various provinces totalled 57,276. Of these, 35,000 were recorded in Madras; 15,000 in Bengal, mostly in the districts of 24-Parganas, Bakarganj, Khulna, Howrah and Jessore; 4,200 in B. & O., 2,100 in Burma; and 700 in the U. P. Over 96% of the cases in Madras occurred in the five districts lying in the north-east of the Presidency. In other provinces the numbers were negligible.

In the U. P. 304 of the 380 recorded deaths from epidemic dropsy occurred in Benares, where the disease was said to have been imported from Bengal and Bihar. The infection was practically confined to the Bengali community living in over-crowded, damp and ill-ventilated localities near the river, but later a few cases occurred amongst other communities. The outbreak of epidemic dropsy which began in Manbhum district in Bihar towards the end of 1935 became widespread early in 1936 in Purulia town and in the *sadr* sub-division of that district. No less than 43,253 cases were recorded, of which 782 ended fatally. The disease was most common among the middle and upper classes whose diet usually consists of parboiled rice, whilst the labouring classes who eat coarse freshly husked rice escaped. Epidemic doctors were deputed to carry out house to house treatment in the affected villages. A field unit from the Calcutta School of Tropical Medicine investigated the outbreak, but no definite conclusion as regards its cause was reached. In Assam similar outbreaks occurred in the towns of Patharkandi, Sylhet, Silchar and Karimganj, but here also no definite causal factor could be traced.

In the Pyapon district of Burma the disease was confined to Indian coolies whose diet is usually ill-balanced. Consumption of damp and deteriorated rice was stated to be frequently associated with the disease. In Mergui, both Telegus and Siamese developed the disease, the diet of the latter class being described as low and deficient. In Upper Chindwin district the disease appeared among labourers in the timber camps. Beri-beri also occurred among the Telegu coolies in Mergui and the Chinese labourers and among the Kachins in Myitkyina and the Bengalees in Rangoon. In Burma, 153 deaths from beri-beri and epidemic dropsy were recorded in 24 out of 75 towns; of these, 81 occurred in Rangoon alone.

The Health Officer, Rangoon made the following remarks in his annual report.

" The explosive nature of the outbreak of epidemic dropsy suggested that the disease was brought about suddenly by some toxin and did not result from any deficiency of diet. There were a number of persons affected during the last epidemic who, as far as could be ascertained, suffered from no vitamin deficiency in their diets. The Bengalis as a race appeared to be particularly susceptible to this disease, 72% of the cases occurring amongst that community. During the year under report there was an epidemic of epidemic dropsy not only amongst the Bengalis of Calcutta but amongst Bengalis domiciled in such

places as Benares and in some parts of Bihar. The disease showed a seasonal prevalence, being well marked in the first half of the rainy season towards the close of June and during the months of July and August. Towards the end of the wet weather it declined. Epidemic dropsy seemed to be more widely prevalent in large towns like Calcutta and Rangoon, situated in the delta area of big rivers not very far from the sea. The consumption of rice was in some way connected with the causation of epidemic dropsy. Whether rice and mustard oil predispose to this disease is a matter for further investigation. The effectiveness of a rice-free diet in the control of epidemic dropsy is well known and the Bengali community of Rangoon were advised by means of advertisements in the local press and by handbills to cut off as much rice from their diet as possible, if its use could not be stopped altogether. Quite a number of them took this advice seriously and the condition of the sufferers not only became better but it prevented a good many from falling ill. Epidemic dropsy was associated with the consumption of both locally milled rice and the parboiled rice of Calcutta. There was no evidence to suggest that epidemic dropsy was of the nature of an infection lurking in a house or any particular locality as has been suggested. The occurrence of cases in whole families or in localities where the Bengali Community predominated was explained by the peculiarity of their diet or racial predisposition. Members of other communities who were immediate neighbours and whose diet was different invariably escaped. The great majority of the sufferers were those engaged in sedentary occupations and belonging to the middle classes. The constant rainfall during June, July and August deprived such people of whatever little opportunities they had for an active outdoor life. The consumption of infected or deteriorated rice owing to storage under moist and hot conditions could not be the only factor in the production of this disease, as such rice was consumed by members of the other communities without any harmful effects. Bengali Hindus were nearly as much effected as the Bengali Mohammedans. Whether an excess of carbohydrate in their diet accounted for their predisposition would appear to be a matter for investigation. The most frequent age of incidence was between 20 and 40 years. Males were far more affected than females. Mortality was on the whole low (0·20 p.m.)."

Ankylostomiasis.

24. Table II (*vii*) gives the numbers of cases treated in British India and in the different provinces. Much the highest number was as usual recorded in the Madras Presidency.

TABLE II (*vii*).

	1934.		1935.	
	Cases.	Rate per 10,000 of total.	Cases.	Rate per 10,000 of total.
Total	210,744	28	233,708	30
N.-W. F. P.	947	4	861	4
Punjab	3,424	2	3,866	3
Delhi	43	..	69	1
U. P.	3,354	4	3,066	3
B. & O.	21,966	31	28,847	40
Bengal	6,062	6	15,664	15
C. P.	1,794	5	3,908	11
Bombay	411	1	7,114	18
Madras	166,438	90	162,956	91
Coorg	2,965	96	2,928	91
Assam	1,848	8	2,790	11
Burma	1,492	4	1,615	5
Baluchistan	..	..	24	..

In the Punjab the anti-hookworm campaign in Gurdaspur district was continued. The Shakargarh *tehsil* investigation unit was replaced by a

propaganda unit whose activities included the construction of 792 borehole village latrines in Shakargarh and Pathankot *tehsils* and the delivery of 311 lectures. The 4 treatment units dealt with 72,571 cases in Shakargarh, Pathankot and Gurdaspur *tehsils*. In order to test the efficacy of the dose of carbon tetrachloride and chenopodium oil given in a saturated solution of magnesium sulphate, a successful experiment was carried out. The stools of 200 selected persons were examined before and after a fortnight's treatment; reductions of 33% in incidence and 65% in intensity of the disease were noted. The stools of the same persons again were examined towards the close of the year and it was found that one course of treatment removed about one-third of the total eggs and that the improvement thus affected was maintained for at least a year. The provincial investigation unit continued to map out the incidence and intensity of hookworm infection and surveyed seven districts. The laboratory unit examined 9,922 stools, 7,717 by Clayton Lane's direct centrifugal flotation method and 2,205 by Stoll's method. In the C.P., examination for the treatment of hookworm was carried out in a number of jails; of 355 cases treated, 333 were cured. As in previous years the activities of the Madras rural sanitation campaign were directed mainly towards the control of hookworm infection and the prevention of soil pollution. The six units were engaged on survey work, propaganda, mass treatment and the construction of bore hole and trench latrines in rural areas.

Leprosy.

(*a*) *General.*

25. When considering leprosy as a health problem, in addition to the numerous difficulties inherent to a densely populated tropical country, two important factors must be kept in mind. The first is religious sentiment which regards leprosy not as an infectious disease but as a visitation of the gods, a fate which cannot be avoided. This sentiment encourages the giving of alms as a religious duty and results in leper beggars congregating in the large cities and at centres of pilgrimage. The second factor is the "joint-family system" under which a father and mother, their married sons and their families and all unmarried children share one household. If any member of the family gets leprosy in an infectious form, all other members are exposed to infection and many children contract the disease in this way.

Leprosy is most commonly met with in certain parts of southern and eastern India, where as many as 2 to 3% of the population may be infected and where the incidence in groups of villages may be 5 to 7%, or even higher. In certain of the Himalayan valleys, also, leprosy is very common. In Central India, its incidence is lower and in the north-west lower still. These variations may have some association with dietary conditions; the virile races of the north-west ordinarily use a well-balanced diet and show less leprosy than the less virile races of the south and east whose diet is relatively poor. It has been noted that a dry climate, hot in summer and cold in winter, is associated in India with a low leprosy incidence, but such areas are inhabited mainly by the more virile and well-nourished races. Leprosy is more common in the more equable climate of the south and east but these areas are inhabited by the less virile races. Leprosy is a disease frequently associated with bad social and hygienic conditions and poverty, but these conditions are not always present. In parts of Madras Presidency which is probably the most advanced province in respect of social and hygienic conditions, the incidence of leprosy is very high. Until recent years leprosy has been in many ways a rural problem, but the development of rapid road transport and the establishment of large

industrial communities recruited mainly from the rural villages have introduced new factors which assist in the dissemination of infection.

Many of the cases seen in India are of a relatively mild neural or neuro-macular type in which the disease does not progress to the more severe forms. As most workers regard the macular or neuro-macular types as non-infectious, out of the estimated total of one million cases in India, at any one time, only about 3-400,000 are infectious. Although isolation of infectious cases is the most useful preventive measure, it is obviously impracticable to attempt the isolation of such large numbers. In any case, the lack of public opinion, quite apart from limited financial resources, makes it impossible to attempt to deal with the problem by legislation making isolation compulsory. Under the existing Leper Act, it is possible to secure the compulsory removal of indigent lepers to institutions and provisions also exist for the prevention of lepers following certain occupations, but for different reasons most of the provisions of this Act have been found difficult to apply.

Various provincial Governments and district authorities are engaged in anti-leprosy work but the only agency working on an all-India basis is the Indian Council of the British Empire Leprosy Relief Association which now has branches in most provinces. The Council maintains a leprosy research department, a training centre in Calcutta and a propaganda officer who tours all over India. Suitable propaganda material is prepared in different languages and a quarterly journal in English is also published. In addition, grants are made to provincial branches for leprosy work carried out in collaboration with or in addition to that done by Provincial Governments and local authorities. Anti-leprosy activities in the provinces include surveys, propaganda, leprosy clinics, isolation camps and leprosaria.

Sample surveys were carried out during the year in the Khulna and Malda districts in Bengal, whilst the work in Bankura district in the same Presidency was extended and modified in order to provide a clinic for every 3 or 4 Union Boards. In the last named district, out of 30,000 persons examined, 878 or 3% were found to suffer from leprosy. Whilst no fresh surveys were carried out in the C. P., systematic re-surveys have been made in the Chhattisgarh division, Berar and Nimar. As a result 591 new cases were discovered during the year. In Madras Presidency during a survey of 87 villages in the Tirrutani *taluk* a total of 955 cases or 1·5% of the population were detected. In the Punjab survey work was extended to the districts of Sialkot, Dera Ghazi Khan, Jhelum, Simla and Hoshiarpur. Of the 664 villages surveyed, 124 were found to have 326 cases (males 254 and females 72). In the U. P., 407 cases were found during the survey of 428 villages in Gorakhpur district. In Cochin State 686 cases of leprosy were detected in a population of 183,705.

During the last ten years several hundred clinics have been established for diagnosis and treatment. It is usually impossible and often unnecessary to maintain a special staff and most of the clinics are held in existing hospitals and dispensaries once or twice a week at hours when other out-patients are not present. A considerable net-work of asylums, colonies, wards, clinics now exists all over the country. There were 202 clinics in Assam, 1 in Bangalore, 5 in Mysore, 2 in Hyderabad (Deccan), 200 in Bengal, 56 in B. & O., 34 in Bombay, 18 in Central India, 30 in the C. P., 441 in Madras, 2 in N. W. F. P. and 57 in the Punjab ; these were all well attended.

Little success has been attained by attempts to encourage isolation of infectious cases. In a few places, houses for infectious cases have been built outside the village, the lepers maintaining themselves partly by the cultivation of plots of land and partly by means of voluntary gifts from the villagers.

In one or two centres an isolation camp serves a group of villages. It is sometimes possible to secure a certain degree of isolation inside the village by building for the infectious case a small shed separate from the joint family house.

The leprosaria now in existence only have accommodation for about 10,000 cases. A few of these institutions are organised and staffed by Government and local authorities, but most are maintained by Christian Missions with the aid of Government grants. Some could accommodate as many as 800 patients, but the majority are much smaller having room for not more than 50 to 100 persons. One practical difficulty in the management of leprosaria is that of dealing with the chronic cases of nerve leprosy generally regarded as non-infectious. Such cases with trophic ulcers and deformities are often definitely in need of hospitalisation and, because of deformaties and disabilities, they are unable to return home and support themselves. Experience has shown the need for two kinds of institution, hospitals for patients in the infectious stages and asylums for the chronic, crippled, deformed and non-infectious cases. The two classes of patients cannot be suitably housed in the same institution. Until recently no attempt had been made to organise agricultural colonies for lepers on a self supporting basis. In one centre such a colony, however, is now under experiment and, in another, one is being planned.

The Mission to Lepers maintained 35 leper asylums and homes,—Madras 6, Punjab 3, U. P. 3, Travancore 2, Bombay 7, C. P. 5, B. & O. 4, Bengal 2, Burma 2 and Central India 1, —whilst financial aid was given to 15 institutions. These institutions had a total population of 9,870, including males 5,032, females 3,092, children 742 and untainted children 994.

The knowledge of leprosy acquired by the average medical student during his college course has been found to be too superficial to enable him to diagnose and treat cases. Special short post-graduate courses of instruction are therefore of great value. In the School of Tropical Medicine, Calcutta, Indian Council B.E.L.R.A., has organised a short two weeks' course in diagnosis and treatment intended for doctors who are to be in charge of leprosy clinics. For doctors engaged in full time anti-leprosy work longer periods of instruction are arranged. The 1935 course was attended by 17 doctors from various parts of India, bringing the total number trained to 765. Two courses attended by 24 students and doctors were also held at the Leper Hospital, Dichpalle.

Workers in India are becoming more and more convinced that the most important method for the control of leprosy is the prevention of infection in children. Epidemiological studies have shown that children and young people are much more susceptible than adults and it is generally believed that serious infections are most frequently contracted in childhood. Infections contracted in later life tend to produce milder and often non-infectious forms of the disease.

(*b*) *Provincial.*

N. W. F. P.—The question of extending the Leper Act was under consideration. In the absence of a leper asylum, patients are sent to the American Mission Asylum, Rawalpindi. It has now been arranged to follow up lepers on release from this asylum. Cases treated in civil hospitals and dispensaries numbered 115. Propaganda by means of posters and leaflets was continued.

Punjab.—The Leper Act has not yet been applied to this province. Five leper homes, managed by Missionary Societies, accommodate over 2,000

lepers at a cost to Government of nearly Rs. 60,000 per annum in grants. Only a minority of the inmates belong to this province, the majority having come from Indian States.

A survey has been carried out during the last five years by the Punjab Branch of the B.E.L.R.A. The survey has so far been extended to 12 districts and about 1,670 cases have been discovered, of whom over 1,000 were in Kangra district alone. In order to provide treatment for these cases, 52 outdoor clinics, excluding 5 at the leper homes, have been established and a proposal to establish a settlement for burnt-out cases in the Lower Bari Doab Colony is under consideration. If sufficient accommodation is thus made available, the Punjab Government propose to consider the advisability of extending the Leper Act to the larger cities in the first instance.

Of the 1,215 cases treated at the clinics, 159 were reported as " relatively cured ", 241 " much improved " and 38 " improved ". Survey work was extended to 5 more districts and in the Kulu sub-division of the Kangra district; 664 villages with a population of 109,879 were systematically surveyed by the propaganda treatment survey method. In 124 villages, 326 cases were detected; all school children were examined for early signs. The post of leprosy officer was provincialised from April, 1936.

Delhi.—Recently Delhi municipal committee decided to open a leprosy clinic at the Civil Hospital; it is proposed to depute a medical officer for special training at Calcutta.

U. P.—Treatment continued to be provided at all hospitals and dispensaries.

B. & O.—Of the 56 clinics at work, 3 were maintained by Government, 3 by the Bettiah Raj, 4 by Missions and the rest by municipalities and district boards with grants-in-aid from the B. & O. Leprosy Relief Committee. These clinics were attended by 17,813 patients.

Bengal.—As a result of the survey carried out by the B.E.L.R.A. staff which revealed a high leprosy incidence, more than 200 clinics have been established. Surveys were carried out in the districts of Khulna and Malda. Two charitable leper dispensaries were at work in Calcutta; they treated 573 new cases and gave 27,172 injections.

Medical institutions concerned with the treatment of leprosy cases were the leprosy department of the School of Tropical Medicine, the leprosy hospital at Gobra in Calcutta and the hospitals at Raniganj, Burdwan and Bankura. At these institutions a total of 6,508 leprosy cases were treated. The Gobra hospital was previously a State institution, but its management has now been entrusted to a Board of Trustees constituted under the Albert Victor Leper Hospital Act of 1935. Pauper lepers form only a small proportion of the asylums' inmates in this province. In Mission institutions about 10% are paupers; in the Albert Victor Leper Hospital, which is the only Government institution, pauper lepers number 60 out of a total population of 142. From investigations made in different centres, it has been found that only about 30% of itinerant lepers are infective and that the rest are burnt-out cases. It is considered that although control of the latter would be desirable, they do not actually constitute a serious danger to public health. The control of itinerant lepers indeed forms only a small part of the general problem of leprosy control.

C. P.—The number of clinics increased to 30 and subcentres to 35 whilst attendances totalled 74,246. 1,021 sedimentation and 2,052 Kahn's tests were made with 902 positive results. The numbers of symptom-free and

improved cases were 222 and 1,059, respectively. Systematic re-surveys and active propaganda were carried out; 591 new cases were detected.

Out of a total income of Rs. 16,547, grants to mission workers and civil surgeons for the purchase of specific drugs amounted to Rs. 2,779 whilst Rs. 3,709 were spent on the maintenance of 5 special leprosy centres. Eleven assistant surgeons, 68 assistant medical officers and 15 private medical practitioners have now been trained in modern methods of treatment. Of the 2,481 cases treated in the 7 asylums, 595 were new admissions. Many of the pauper inmates are of the " burnt out " type and are not a source of infection

Bombay.—Arrangements have been made to give medical officers a special training in leprosy with the object of forming a cadre of officers with these special qualifications. Table II (*viii*) gives a list of institutions concerned with leprosy. In addition, a small number of clinics have been opened at different centres.

Table II (*viii*).

Name of Institution.	Maintained by	Accommodation (beds)	Numbers treated	
			Indoor.	Outdoor.
1 Acworth Leper Home, Matunga.	Local and Municipal fund.	364	420	28
2. Edulgi Frameji Albless Leper Home, Trombay .	Private-aided .	62	34	..
3. Kagrapeth Leper Asylum, Ahmedabad . . .	State-public . .	95	134	..
4. Parvati Bai Leper Hospital, Surat . . .	Private-aided . .	132	Not available.	
5. Leper Home and Hospital, Nasik Town Mission	..	100	189	96
6. Lady Polworth Home for untainted children, Nasik	..	18	Not available.	
7. Leper Hospital, Miraj .	Presbyterian Church .	..	Not available.	
8. Leper Hospital, Sholapur.	Mission to Lepers .	75	90	..
9. Leper Hospital, Hindalgi, Belgaum	,,	29	56	1
10. Pui Leper Hospital .	,,	66	94	..
11. Puladpur Leper Hospital.	,,	185	246	66
12. Sir Dinsha Manekji Petit Leper Hospital, Ratnagiri	Private-aided . .	100	110	..
13. Vengurla Leprosarium .	..	..	..	..
14. Hiranand Leper Hospital, Mangopir, Karachi .	Government . .	60	174	..
15. Leper Hospital,Khondwa	Mission to Lepers .	150	188	75

Madras.—Steady progress was maintained in the leprosy campaign. With the opening of 36 new centres, the number was raised to 441. All Government medical institutions, almost every local fund and municipal medical institution and about 50 subsidised rural dispensaries have clinics, at which about 40,000 patients were treated and 809,000 injections were given. The daily average strength of 12 asylums, with accommodation for 2,290 lepers, was 2,100. Of these 11 are government aided and one private and only treatable infectious cases are taken in. District Leprosy Councils continued to do useful work; the Chief Leprosy Officer, in addition to his duties as a group leprosy officer, coordinated work in the clinics and asylums and directed and supervised the work of group leprosy officers, etc..

No detailed leprosy survey has been carried out, except in Saidapet and Salem towns. In Saidapet with a population of 33,000, no less than 460 cases of leprosy were detected. Leprosy surveys are generally carried out in villages with a view to locating clinics in the nearest medical institutions.

The local Government consider that the introduction of any element of compulsory segregation would be likely to induce a greater desire for concealment of the disease than at present and to destroy the confidence which is being gradually established between lepers and medical officers. Compulsory segregation and the provision of accommodation and treatment for all cases of leprosy is considered impossible from the point of view of both finance and expediency.

Coorg.—Leprosy is not a problem in this province.

Assam.—A total of 4,926 lepers were treated in the leper asylums and at other treatment centres. The number of inpatients in the asylums at Sylhet, Gauhati and Kohima, in the leper ward at Dhubri and the leper colony at Tura was 377, whilst 1,244 outpatients attended the medical dispensaries, and 2,305 the dispensaries of the Public Health Department ; the remainder came for treatment at other centres. The number of outdoor clinics under the Public Health Department was 61, and under the Medical Department 138. Nine sub-assistant surgeons of the Public Health Department were trained locally in the technique of leprosy treatment. Assistant surgeons of the Public Health Department carried out the usual propaganda work with the aid of magic lanterns. Leprosy surveys have disclosed the existence of large numbers of unrecognised early cases. At present only towns and certain restricted rural areas have been declared, under Section 3 of the Lepers Act, as areas from which pauper lepers may be sent to the provincial asylum at Sylhet.

Burma.—Conditions in this province are different from those of Indian provinces with contiguous land frontiers, intersected by roads, railway and river communications. Lepers can easily be stopped at the port of entry. The provisions of the Indian Lepers Act having failed in practice the policy of institutional treatment was abandoned in favour of an intensive campaign against the disease in the countryside. An average of only 67 pauper lepers are housed at present in the various leper asylums, but this number is only a fraction of the huge total existing in this province.

Methods for the control of the disease include propaganda treatment and survey, plus segregation under the Burma Village Act. A special leprosy officer has been employed since 1931 and surveys have shown that the true incidence of the disease in the more heavily infected districts is about 16 *per mille.* The treatment and segregation of infective cases of this large leper population is a formidable problem. Its most practical solution is thought to be the establishment of colonies where housing and food are assured to the leper, where conditions of life approximate to those of an ordinary village and where those who are able to work are employed in raising stocks of food for their own consumption, whilst regular treatment can be provided for the cure or early arrest of the disease. Two such colonies are at work and a third has been proposed.

High prevalence of leprosy was reported from Pyawbwe town and Yemethin district. Colonies for the housing, feeding and treatment of lepers were maintained at Monywa and Minbu. The maximum number of lepers in the Monywa colony was 66 as against available accommodation for 48 in six cottages. The maximum number in the colony at Minbu was 38 and several patients had to be refused admission. A third colony was maintained by the Roman

Catholic Mission at Kengtung, the maximum number of inmates being 110. All these three colonies received capitation grants from the Burma Branch of British Empire Leprosy Relief Association. Two more colonies in Meiktila and Thaton were proposed. In regard to the utility of leper colonies the D. P. H. remarks :—

"This Department considers that in the establishment of leper colonies lies the most effective measure for the control of leprosy in Burma. A colony is much cheaper to establish and to maintain than an asylum. It has an advantage over clinics in that in the colony the treatment can be taken to the segregated lepers, instead of expecting the individual lepers, to go for treatment to the nearest hospital clinic which is frequently some miles distant. Were sufficient colonies started throughout the province, they would exercise a marked effect in checking the spread of leprosy among the general population and in addition they would exercise a marked effect on the control of pauper lepers. The class of leper who now leaves his village to go and beg in the towns would have a colony to go where his housing and food would be assured, where the conditions of life would approximate to those of his village and where he would get regular treatment leading to cure or early arrest of his condition. He would be spared the experience of being regarded as an outcast and having to descend to the level of a pauper."

Leprosy clinics were at work in the districts of Insein, Minbu, Meiktila and Myaungmya ; the results were on the whole discouraging.

Ajmer-Merwara.—The Leper Act is being extended to this province. No leprosy survey has been conducted ; it is therefore impossible to give an accurate estimate of the prevalence of the disease. It may, however be concluded from the small numbers of lepers treated in the Victoria Hospital, Ajmer, that the incidence is low. Indigenous cases numbered only 11 in 1933, 22 in 1934 and 20 in 1935 ; the remainder being from outside. A large number are in fact itinerant lepers from other provinces who visit the town on the occasion of religious gatherings.

Baluchistan.—Cases of leprosy are uncommon.

Rabies and Hydrophobia.

26. Table II (*ix*) gives the numbers of recorded deaths from rabies in rural and urban areas.

TABLE II (*ix*).

	Deaths.		Total.	
	Rural.	Urban.	1935.	1934.
Total	**2,284**	**393**	**2,677**	**2,916**
N.-W. F. P.	2	..	2	2
Punjab	108	18	126	160
Delhi	..	2	2	2
U. P.	391	81	472	660
B. & O.	152	12	164	176
Bengal	728	55	783	830
C. P.	104	20	124	134
Bombay	143	37	180	206
Madras	434	112	546	412
Coorg	..	..	..	..
Assam	55	10	65	77
Burma	167	46	213	257

In N.-W. F. P., 405 cases attended district headquarters hospitals and centres in the agencies. In the Punjab, 9,405 patients were treated at the different centres. Deaths from hydrophobia numbered males (95) and females (31). In the C. P., of the cases treated at various centres, 1,086 were dog bites and 216 bites of other animals. Of a total of 1,238 cases treated, 1,041 were cured, 17 died and 180 could not be traced. A total of 2,908 cases were treated at the different centres in Burma. Byelaws for the keeping of dogs and for the destruction of stray dogs within municipal limits were brought into force in five towns.

Venereal Diseases.

27. Table II (*x*) gives the numbers of cases treated in hospitals and dispensaries during 1935.

TABLE II (*x*).

	Gono-coccal infection.	Syphilis.	Soft Chancre.	Other Venereal diseases.	Total.	Per 1,000 of total.
Total	**349,326**	**304,211**	**29,595**	**29,672**	**775,804**	**10**
N.-W. F. P.	2,422	7,330	187	346	10,285	5
Punjab	12,878	17,873	472	1,376	32,599	2
Delhi	74,664	7,009	..	..	81,673	7
U. P.	1,172	1,137	168	4,001	6,478	1
B. & O.	25,897	39,055	2,271	5,813	73,036	10
Bengal	47,860	30,605	4,369	17,792	100,626	10
C. P.	12,479	18,076	1,126	2,337	34,018	9
Bombay	22,184	26,786	3,728	2,745	55,443	14
Madras	122,270	124,915	11,895	52,603	311,683	18
Coorg	318	106	7	29	460	1
Assam	4,333	2,172	95	321	6,921	3
Burma	22,694	28,870	5,263	5,307	62,134	18
Baluchistan	155	277	14	2	448	1

Anti-venereal measures were conducted in different directions in different provinces. For example, in B. & O. a campaign was conducted during the *Snan* and *Rathjatra* festivals in Puri. In Bengal and the C. P., treatment was provided in dispensaries, in the latter province the Indian Red Cross Society assisting in the purchase of the necessary drugs. In Bombay, assistants in the civil hospitals were given courses of training in venereology at Poona and Ahmedabad whilst in Madras Presidency the venereal diseases clinic in the Madras General Hospital dealt with 7,150 cases : 9 medical officers were given a course of training ; and propaganda was conducted by means of leaflets distributed to patients.

The D. P. H. of Burma remarks :—

" It is impossible to give any accurate estimate regarding the prevalence of venereal disease in the province. The general opinion amongst medical practitioners is that their incidence is very high. As the public health statistics only relate to deaths, they afford no clue, for a death is rarely ascribed to syphilis or gonorrhœa. Public health reports state that the majority of venereal cases are treated by quacks. The information that is being collected by child welfare centres goes to show that a large number of the mothers attending the centres are infected with syphilis which accounts

for a high number of abortions. The Rangoon General Hospital reports that out of 805 post-mortem examinations carried out during the year pathological signs of syphilis were detected in 21 %, the corresponding percentages for 1934 and 1933 being 21 % and 20 % respectively."

Yaws.

28. This disease was reported to be fairly prevalent in Assam where a total of 4,201 cases were treated with satisfactory results. Amongst those who took the trouble to complete treatment, the relapse rate was very low. Goalpara district was worst affected, 1,780 cases being treated in that area but three other districts recorded several hundred cases each. In order to bring all foci of infection under control, an exhaustive survey was being made. In Burma, this disease is prevalent in Mandalay district, along the valley of the Tenasserim river in Tavoy and Mergui districts and also in some other parts of Mergui, Kyaukse, Katha and Lower Chindwin districts. No treatment was available during 1935 for want of funds, but towards the close of the year the Burma Branch of the Indian Red Cross Society sanctioned Rs. 1,000 for the purchase of drugs.

Kala-azar.

29. In the Punjab, the U. P., B. & O., C. P., Bombay and Burma, kala-azar is only rarely met with and is not a disease which gives cause for any anxiety. In Madras Presidency, a total of 2,130 cases were treated and of these 857 were recorded in Madras city, 566 in Ramnad district and 490 in Tinnevelly district. These three areas have constituted foci of infection for many years past, but the records would indicate that the disease is not spreading to fresh centres. In Bengal, the situation was much more serious. Cases totalled 138,274 and deaths 17,469. Of the deaths 16,895 occurred in rural areas and 574 in towns including 149 in Calcutta. The largest numbers were registered in the districts of Rangpur (18,255), Bakarganj (12,557) and Rajshahi (10,445). Compared with 1934, phenomenal increases were recorded in the districts of Rangpur, Bogra, Bakarganj, Faridpur, Noakhali and Tippera. A total of 11,100 cases, 2,298 less than in 1934, were treated in Assam. Of these, 845 died, giving a case mortality of 8 %. Over 74 % of the cases occurred in the districts of Sylhet, Goalpara, Kamrup and Nowgong and over 75 % of the deaths in the first three of these districts and in Sibsagar. The kala-azar campaign comprises intensive and detailed surveys for the detection of fresh cases and treatment by means of intravenous injections of urea stibamine. Certain areas in the Hailakandi sub-division in Cachar district beyond the jurisdiction of the existing dispensaries were reported to be heavily infected and are now being surveyed. The Public Health Department continued to maintain treatment dispensaries in infected areas.

Relapsing fever.

30. During the year under report relapsing fever was nowhere present in epidemic form and it is even doubtful whether many of the recorded cases were true relapsing fever. In the Punjab, 142 cases and 121 deaths were reported from six districts ; in the U. P. sporadic infection caused 213 deaths ; B. & O. reported 17 deaths, of which 15 occurred in one centre ; Bengal, in contrast with recent years, reported only 8 deaths ; whilst Bombay, Madras and Assam were entirely free. The only province which was apparently seriously infected was the C. P., where the ordinary registration agencies recorded 4,538 deaths. These cases must, however, have been wrongly classified as not a single case was reported by the medical officers.

Influenza.

31. In the Punjab, this disease caused more deaths than in the previous year, 2,317 cases with 439 deaths being recorded as against 6,986 and 17 in 1934. The disease was most common in the central and south west districts. A total of 437 deaths were recorded in the U. P., of which 253 were in urban and 184 in rural areas. In Bengal, the number of deaths decreased from. 4,124 in 1934 to 3,616. In the C. P., the disease was responsible for 1,217 deaths the numbers of cases in the severely infected districts being Nagpur 11,839, Jubbulpore 7,178, Akola 5,333, Buldana 4,302, Amraoti 3,688 and Nimar 3,542. In Assam only sporadic incidence was recorded, deaths numbering 42. There were 61 deaths in Burma, 1 in N.-W. F. P. and 187 in Bombay.

Goitre.

32. In the U. P., a total of 114,476 cases were treated in hospitals and dispensaries, the largest numbers being met with in the districts of Dehra Dun 4,813, Gorakhpur 12,504, Gonda 24,207, Garhwal 4,267, Kheri 6,247, Nainital 2,746, Moradabad 1,287, Pilibhit 1,327, Saharanpur 1,702, Bijnor 1,328 and Ballia 2,210. A total of 307 cases sought treatment in Bombay Presidency, 188 in the C. P., 2,773 in N.-W. F. P., 33,564 in the Punjab, 91,838 in B. & O., 27,735 in Bengal, 569 in Madras and 33,684 in Assam. In Burma, the disease was reported from a number of hill areas in Toungoo, Bhamo and Salween districts. Extensive hospital treatment was carried out in the districts of Myitkyina (1,726 cases), Northern Shan States (6,673) and in Mogok and Thabeitkyin hospitals (564).

Guineaworm.

33. Cases treated in hospitals and dispensaries included N.-W. F. P. 965, Punjab 1,729, U. P. 2,129, B. & O. 27,542, Bengal 44,779, C. P. 371, Bombay 7,561, Madras 15,074, Assam 127 and Burma 30.

Diphtheria.

34. The records for this disease were as usual of doubtful accuracy and do not perhaps give much indication of the actual incidence of the infection. In the Punjab, 197 cases and 91 deaths were reported ; in the U. P. the deaths numbered 37 in rural and 68 in urban areas. The registrars of the Public Health Department in the C. P. recorded 90 deaths in five centres, but district medical officers reported only 86 cases with 11 deaths. Bombay Presidency registered a total of 67 deaths but in Karachi city 137 cases were treated in hospital, of which 16 died and 4,828 anti-diphtheritic inoculations were performed. The incidence of the disease in Karachi indicates that epidemics of diphtheria do occur in India, but it is not possible under the present system of registration to obtain records of these outbreaks except when they come to the notice of trained medical officers of health.

Typhus Fever.

35. The remarks made in connection with the records for diphtheria apply with equal force in the case of typhus fever. During recent years, medical officers have been on the look out for typhus outbreaks so that, in urban areas at least, future records may be expected to be more in accordance with actual facts. During 1935, 25 typhus deaths were recorded in N.-W. F. P. and 53 deaths in rural and 122 in urban areas in the Punjab. In this province,

deaths were recorded in the districts of Amritsar (337), Gurdaspur (129), D. G. Khan (97) and Multan (60). Of 76 deaths in the U. P., 51 were recorded in urban and 25 in rural areas. In B. & O., 32 deaths were recorded as "thagpus" fever which is apparently identical with typhus fever.

Cancer.

36. Little accurate information is available in regard to the incidence of cancer in India. A certain number of deaths from cancer have been recorded in several provinces, but these have not been included in this report, as they can convey no real indication of the actual position.

Cerebro-spinal Fever.

37. *N.-W. F. P.*—The disease was prevalent in mild form, 52 cases with 17 deaths being recorded. Of the total, 22 cases and 7 deaths occurred in March and 11 and 4 in April. There was nothing unusual in the age distribution.

Punjab.—Totals of 419 cases and 200 deaths were recorded as against 275 and 152 in 1934, the case mortality rates being 48 % and 55 % in these years. Of the total, 79 deaths occurred in rural and 121 in urban areas ; 143 were males and 57 females. Nine districts were infected. Fifteen cases and 12 deaths occurred in the Lahore Borstal Institution and one fatal case in the Lahore Central Jail.

Deaths by months are given below :—

	Deaths.
January	2
February	20
March	42
April	53
May	12
June	20
July	13
August	14
September	7
October	6
November	5
December	6

Strenuous efforts were made to combat the disease on its appearance and preventive measures included isolation of cases, segregation of contacts, examination of post nasal swabs for detection of carriers, disinfection of infected houses, improvements in ventilation and propaganda.

Delhi City recorded 548 out of 618 cases in the whole province ; deaths numbered 216 out of a total of 348. In New Delhi, Notified Area Civil Lines, Delhi Shahdara, and in the rural area there were 49, 13, 2 and 6 attacks with 15, 114, 1 and 2 deaths respectively. In spite of the impracticability of stopping free communication between the three urban areas, the lower incidence of the disease in the Notified area and in New Delhi bear testimony to their comparative lack of congestion, their freer ventilation and their better sanitary conditions. The death rate was very high, being over 50 % in Delhi City and in the Civil Lines.

Cases and deaths due to cerebro-spinal fever during 1935 in different areas of Delhi province by months and by community and sex are detailed below :—

Months.	Delhi City.		New Delhi.		Notified Area Civil Lines, Delhi.		Delhi-Shahdara.		Rural Areas.		Total.	
	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.
January	75	29	14	...	2	14	...	...	...	...	91	43
February	145	63	3	...	5	30	2	1	...	...	155	94
March	151	51	11	6	3	24	...	...	...	...	165	81
April	71	28	5	3	2	13	...	...	4	1	82	45
May	52	26	2	1	...	11	...	...	1	1	55	39
June	19	8	6	1	...	1	...	...	1	...	26	10
July	6	2	2	1	...	2	...	...	...	...	8	5
August	6	2	2	1	...	4	...	...	...	...	8	7
September	5	1	...	...	...	4	...	...	...	...	5	5
October	3	1	2	1	1	3	...	...	...	...	6	5
November	10	3	2	1	...	5	...	...	...	...	12	9
December	5	2	...	...	...	3	...	...	...	...	5	5
Total	548	16	49	15	13	114	2	1	6	2	618	348

Male cases were more than twice as numerous as female cases and Mohammadans suffered more severely than Hindus.

" Carriers ", over-crowding and dust seem to be important factors in the spread of the disease.

Cases and deaths due to cerebro-spinal fever by classes and sex in different areas of the Delhi Province during 1935 are given below :—

Classes and Sex.	Delhi City.		New Delhi.		Notified Area Civil Lines, Delhi.		Delhi-Shahdara.		Rural Areas.		Total.	
	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.
All Classes	548	216	49	15	13	114	2	1	6	2	618	348
Males	409	154	44	14	12	86	...	...	4	1	469	255
Females	139	62	5	1	1	28	2	1	2	1	149	93
Hindus	356	152	29	9	12	92	2	1	4	1	403	255
Males	265	105	25	8	11	68	...	...	2	...	303	181
Females	91	47	4	1	1	24	2	1	2	1	100	74
Muhammadans.	190	62	20	6	1	22	...	...	2	1	213	91
Males	143	48	19	6	1	18	...	...	2	1	165	73
Females	47	14	1	...	...	4	...	...	...	...	48	18
Christians	2	2	...	...	...	...	...	...	...	...	2	2
Males	1	1	...	...	...	...	...	...	...	...	1	1
Females	1	1	...	...	...	...	...	...	...	...	1	1

U. P.—Deaths totalled 756, males 511 and females 245. Over 87 % of the total deaths occurred during the first half of the year and over 56 % in May and June.

B. & O.—Fifty-five cases were treated in hospitals and dispensaries. Fifteen cases were between 4—8 years of age, 3 were 14 years and 32 between 20—30 years of age. Of the total, 48 were males and 7 females.

In Orissa nine cases were treated in the General Hospital, Cuttack ; 5 were fatal. Their ages varied from 14—42 years. No cases were reported from other parts of the province.

Bengal.—Figures are available in respect of the Campbell Medical Hospital and these are given below :—

Seasonal incidence and mortality.

	Admissions.	Deaths.	Case Mortality %.
Total	817	498	61
January	83	60	72
February	116	72	62
March	110	60	55
April	77	44	57
May	56	24	43
June	60	40	67
July	52	38	73
August	60	39	65
September	55	33	60
October	39	23	59
November	55	36	65
December	54	29	54

Incidence and mortality according to age.

	Admissions.	Deaths.	Case Mortality %.
1—4 years	17	7	42
5—9 years	40	21	52
10—14 years	62	37	60
15—24 years	277	158	57
25—34 years	246	160	65
35—44 years	124	81	65
45—54 years	36	26	72
55 years and over	15	8	53

Caste and sex incidence.

	Male.	Female.	Total.
Hindus	555	95	650
Mohammedans	142	9	151
Others	13	3	16
Total	710	107	817

In Calcutta city a total of 1,193 cases with 701 deaths were reported. Half of these cases and deaths occurred during the first four months of the year. The maximum number of cases among males occurred during the age-period 20—25 years and among females between 30—35 years. The incidence among coolies and labourers seemed to be higher than among other classes of the population.

No association was demonstrated between attack rate and density of population. The following table gives the numbers of cases and deaths by months:—

	Cases.	Deaths.
Total	1,193	701
January	110	65
February	151	101
March	203	142
April	109	63
May	87	57
June	85	46
July	62	41
August	85	43
September	71	40
October	61	20
November	93	43
December	76	40

C. P. & Berar.—The ordinary registration agency reported 191 deaths; the civil surgeons' returns however showed 158 cases and 80 deaths. Preventive measures included the temporary creation of two epidemic dispensaries in Buldana district; the closure of cinemas and schools; the promulgation of special rules under the Epidemic Diseases Act; and propaganda work.

Bombay.—Deaths totalled 396; 382 in urban and 14 in rural areas. The town of Ahmedabad had a severe epidemic during which 308 cases and 180 deaths were reported; the height of the epidemic was reached in May. 103 cases were recorded in the age group 21—30 years and 66 cases in the group 1—10 years. Of the total deaths 240 were males and 68 females. The lower castes suffered most, 133 cases or 43 % of the total being reported. The incidence was higher in thickly populated areas where the poor crowd into chawls and where environmental sanitation is of a low standard.

In Bombay city the disease was present throughout the year and 211 cases and 136 deaths were reported. The monthly incidence was irregular and generally not more than one case in a family was reported. The age groups 15—40 years showed the highest incidence and the number of male deaths (112) was nearly 5 times that of females (24). Of the total, Hindu deaths numbered 86, Muhammedans 27, Indian Christians 14, Jains 5, Parsis 2 and Europeans and Anglo-Indians one each. Preventive measures included isolation, disinfection and inoculation. Data was insufficient to estimate the protective value of inoculation. *Madras, Assam, Burma* and *Coorg* were practically free from this disease during the year under report.

Ajmer-Merwara.—A total of 122 cases was recorded, males 99 and females 23. Fourteen were children aged 5 years or under; 23 between 6—10 years; 25 between 11—15 years; 23 between 16—20 years; 27 between 21—30 years; and 10 between 31—40 years. Over 85 % of the total cases were registered from February to June.

Trachoma.

38. In N.-W. F. P. 76,396 cases were treated, including 29,299 in Peshawar, 11,030 in Hazara and 10,447 in D. I. Khan district. In the Punjab a total of 1,391,016 cases attended for treatment; Jullundur (112,431), Ferozepur

(91,006), Sialkot (79,636) and Amritsar (77,977) recorded the largest numbers. In Delhi province, of a total of 179,597 cases of eye diseases treated, 9,115 or 5 % were trachoma. In the U. P. cases treated totalled 268,340. The districts of Agra (10,482), Allahabad (12,470), Bijnor (23,625), Lucknow (11,998), Moradabad (12,176) and Sitapur (11,058) reported the largest numbers. In the C. P. a total of 26,153 cases were treated, the districts chiefly concerned being Buldana (4,202), Hoshangabad (3,045) and Bilaspur (2,608). In Bombay, 20,279 cases were treated in medical institutions; 5,549 in Sind, 5,466 in Gujarat, 7,940 in the Deccan and 1,324 in the Konkan. Cases treated in other provinces numbered Madras 62,844, B. & O. 44,649, Burma 16,820 and Assam 532.

SECTION III.

MATERNITY AND CHILD WELFARE.

Maternal Mortality.

39. The figures for recorded maternal deaths in India are still far from accurate and some of the rates given in Table III (*i*) cannot be taken as indicating actual conditions in any of the provinces, although in Madras, Bengal, Bombay and the C. P. the rates are approximately twice as high as those which have caused grave concern to the health authorities in England. Dr. Balfour during her investigations in Assam found maternal death rates among the tea garden populations varying between 40 and 130 per 1,000 births. Reference has been made in previous reports to an investigation made in the Madras Presidency in a number of municipal areas where the rates were found to be three, four and five times as high as the English maternal mortality rate. It will be noted that urban areas almost universally return higher rates than rural areas and this may partly be due to the fact that a considerable number of municipalities now employ medical officers of health who are concerned in the improvement of registration. Year after year attention has been drawn to the faulty registration in rural areas, but it is difficult to see how improvement in this connection can be obtained until the whole system of registration is reorganised and placed in the hands of district health officers. The recorded rates would seem to indicate that the advantage lies with rural areas perhaps because of the better physique and nutrition of the mothers which might counterbalance the lack of skilled attention at child birth, but this factor certainly does not influence the rates in such an overwhelming manner as suggested by the recorded figures.

TABLE III(*i*).

Maternal Deaths.

	Number.			Rates per 1,000 births.		
	R.	U.	Total.	R.	U.	Total.
N.-W. F. P.	No information available.					
Punjab	840	273	1,113	1·0	2·2	1·0
Delhi	14	112	126	0·1	0·3	0·2
U. P.	655	1,716	2,371	0·4	7·0	1·4
B. & O.	Information not available.					
Bengal	14,961	647	15,608	9·6	8·4	9·5
C. P.	4,291	960	5,251	7·0	11·9	7·9
Bombay	3,849	1,177	5,026	6·0	8·0	6·2
Madras	11,256	3,183	14,439	7·9	13·2	8·6
Coorg	34	1	35	9·1	2·3	8·4
Assam	No information available.					
Burma	1,350	467	1,817	3·8	9·8	4·5
Ajmer-Merwara	..	23	23	..	3·1	..

In the absence of medical certification of death no accurate classification of the causes of death relating to an unselected population are available, but some idea of the relative importance of a number of clinical causes may be gathered from the records of certain women's hospitals which were summarised in the Journal of the Association of Medical Women in India for August, 1936. Of 638 maternal deaths included in this paper, 139 were due

to or were aggravated by diseases associated with pregnancy and child-birth whilst 499 were directly due to child bearing. These deaths were classified under the following headings :—

1. Sepsis (following delivery or abortion)	188	37·68%
2. Anæmia of pregnancy	88	17·64%
3. Accidents of labour (shock, ruptured uterus)	72	14·43%
4. Toxæmias	64	12·83%
5. Hæmorrhage	59	11·82%
6. Embolism	12	2·40%
7. Ectopic	5	1·00%
8. Unclassified	11	2·20%
	499	100·00%

The large proportion of deaths due to sepsis is accounted for by the fact that many of the cases had been examined or mishandled and were infected before admission. Labour was described as normal in only 12 or 7·9% of the septic confinements, a clear indication of the preponderance of exogenous infection in this country. The anæmias are a mixed group including both primary and secondary, but this important cause of maternal deaths in India does not appear at all in the death statistics of western countries. Associated diseases stand second in importance in India and are an indication of widespread ill-health and of the urgent need for better provision of medical and obstetric relief for the female part of the population.

The magnitude of the problem facing the maternity and child welfare movement in India can be gauged from the figures appearing in this report. A total of 2,848,099 or 43% of the deaths registered during 1935 occurred among children under the age of five years. Maternal deaths arising out of pregnancy are estimated to account for a further 150,000 to 180,000 deaths annually. Accurate figures, as already has been stated, are not available, but the maternal mortality rates for the larger towns indicate that large numbers of women die during the child-bearing age-periods. Along with this wastage of life a very serious wastage of health takes place. The percentage of women disabled as a result of pregnancy and labour may perhaps be taken as not less than 30% and in a country where nearly ten million births are registered annually, the percentage of women temporarily or permanently handicapped must be very large. To the physical disabilities from which both mothers and children suffer must be added loss of happiness and the less tangible, though not less important, damage to stability of temperament which follows in the wake of neglect of provision for the education and care of the mother and her family. General environmental measures undoubtedly effect a reduction in the incidence of disease and mortality, but the extent to which environmental hygiene alone can control disease is limited in certain respects. Without doubt education in the use of the services provided must accompany the establishment of these services if the maximum benefit is to be derived. Similarly the best midwifery schemes will be ineffective unless accompanied by widespread improvement in the general health. No service, however efficient, can combat lack of resistance in the individual. The failure of hospitalisation of midwifery to reduce the maternal mortality rate is indicated in the Bombay figures. There the maternal mortality rate in 1933 was 7·5 and in 1934 6·9 per 1,000 births, whilst the percentage of cases admitted to institutions was 70·6 and 68·3, respectively. At the same time, skilled attendance during pregnancy, labour and the early period of child life are an essential

part of any general scheme of control. The present unsatisfactory position of even a minimum basic maternity and child welfare service in India is reviewed in subsequent paragraphs.

Midwifery Services.

40. So far as information is available, beds provided for midwifery cases numbered 41 in Assam, 732 in Bombay Presidency (475 in rural areas and 257 in urban areas), 282 in Burma, 212 in the C. P., 68 in Delhi, 1,557 in Madras Presidency (389 for rural areas and 1,168 for urban areas) and 137 in N.-W. F. P. Table B in Appendix III gives the numbers of maternity and child welfare centres and the staffs employed in those centres in the various provinces.

Ante-natal Care.—The numbers of ante-natal clinics are slowly increasing, but even at the present day many of the hospitals attached to medical colleges, medical schools and training institutions for midwives have no adequate arrangements and the students leave college with a minimum knowledge of the scope and value of ante-natal care. Ante-natal care, of course, should be an activity of every infant welfare centre, but here again the work is handicapped by the scarcity of visiting doctors interested in prevention, by lack of contact with the expectant mothers, by lack of funds for the supply of extra nourishment and by an inadequate provision of hospital accommodation and skilled attendance at child-birth. The number of hospitals in India which have ante-natal clinics is unfortunately not known; the number of welfare centres is approximately 800. Maternity benefit is paid to women workers in Bombay, Sind and the C. P. and a draft bill on this subject is now before the Legislature in Bengal. In these provinces the maternity benefit must be of a value to the woman concerned, but unfortunately it is reported that the amounts paid are often completely absorbed into the family income so that little is left for the special care of the mother and for the expenses of her confinement. This of course can only be amended when the families concerned realise, more fully than they do at present, the importance of spending the amounts paid for maternity benefit on the purposes for which they were intended.

Institutional Midwifery.—The most complete returns are those from the provinces of Bombay and Burma. In Bombay Presidency, where 806,989 births were recorded, 257 beds were available in urban centres and 475 beds in mofussil areas, these figures working out at one bed for every 1,102 confinements instead of 1 for every 100 confinements which may be taken as a reasonable, although not ideal, estimate of the number necessary. Burma has one maternity hospital with 132 beds, 35 hospitals with an aggregate of 150 beds for confinement cases, whilst an additional 145 hospitals admit maternity cases to the general wards. These figures may be compared with the 400,000 births registered during 1935 in that province. Information relating to mission hospitals and to those run by private enterprise is not included in the provincial returns, but it is evident that in every province of India the number of maternity beds requires to be largely augmented. These extensions are all the more urgently called for because of the rapidly increasing demand for admission to maternity hospitals or maternity homes, particularly in western and southern India. Small maternity homes have sprung up in many centres, often as a result of voluntary enterprise, but many of these are staffed by illiterate *dais* who are incapable of keeping records or even of taking temperatures

and who have a very limited knowledge of asepsis and isolation. In England it was found necessary, in order to ensure a reasonable standard of equipment and adequate staffing, to legalise the inspection and supervision of these maternity homes and, should the numbers of these homes increase in India as there is every indication that they will, the question of their supervision must be a matter of considerable urgency and is one which should be taken up without avoidable delay by provincial authorities."

Domiciliary Midwifery.—Registration of midwives has only recently been established in most of the provinces, so that the numbers of trained midwives are not yet known. The employment of midwives by local authorities is not compulsory in this country, but many municipalities and district boards have established domiciliary midwifery services. In Madras, for instance, 252 are known to be employed by municipal committees, 102 by district boards, 40 by voluntary societies and an additional 1,076 are attached to dispensaries or are conducting private practice. This gives a total of 1,559 for 1,671,186 recorded births or 1 for every 1,072 births against the 100 to 150 which is the maximum number any midwife can reasonably be expected to conduct in any one year. It is true to state that the vast majority of confinements are still conducted by untrained attendants ; the percentage in the United Provinces is 73 and in Madras 50.

Apart from the scarcity of training schools and of trained midwives, a serious handicap exists in the lack of supervision of the midwives and their practice. No full time inspectress of midwives has yet been appointed in any province and supervision of the midwife in private practice does not exist. The duty of inspection of the salaried midwife meantime devolves on officials of the Medical or Public Health Department according as she is attached to a hospital or dispensary or a welfare centre. Civil surgeons and health officers have little time to devote to these inspections and in any case custom would debar them from being present to witness the midwife at work. Effective supervision can only be made by experienced and well trained midwives, but unfortunately these exist only in very small numbers.

The extent to which the general practitioner is engaged for the conduct of labour cases varies in different provinces according to the customs of the community, but generally it may be said that medical attendance is only secured in abnormal cases and this too for the most part only in urban centres. The cities and a number of the larger municipalities now employ medical women for domiciliary midwifery, but no provision exists outside those areas and, as has already been indicated, hospital accommodation is limited, even although admission and service there are free, whilst the difficulties of transport and communications add another difficulty to the problem.

Facilities for Training.

41. The training of medical students in obstetrics is not yet uniformly organised throughout India. The teaching of midwifery under domiciliary conditions has been introduced in only one training institution, namely, in the Women's Medical School, Ludhiana. Great difficulty is also experienced in obtaining a sufficient number of confinement cases in the teaching hospitals for the satisfactory training of medical students even on the standards now laid down. Moreover, post-graduate courses for the general practitioner are rare, whilst facilities for specialist courses in obstetrics exist only in the cities of Calcutta, Bombay and Madras.

As regards training schools for midwives, these are markedly insufficient for the needs of the country. Legislation regulating the training and registration of midwives has been passed in the eight provinces of B. & O., Bengal, Bombay, Burma, C. P., Madras, Punjab and the U. P. The Bombay Act was passed in 1935 and those in the U. P. and Bengal in 1934. The Nursing Councils established under these Acts are of too recent origin to have made their potential benefits realised, but a beginning has been made and it is to be hoped that in time the number of training schools will be increased and the standards of training improved. The growing emancipation of women seems likely to further the improvement towards better midwifery.

A serious defect in the Nurses, Midwives and Health Visitors Registration Acts, with the exception of that of the Punjab, is that no cognisance is taken of the indigenous *dai*, consequently no provision has been made for the prohibition of practice by unregistered women. In these circumstances, unregistered midwives or those removed from the registers for malpractice or incompetence suffer no disability, because the only services from which they are debarred are those financed from official sources. Moreover, private practice is more lucrative and the work is easier unless subject to interference, so that little is to be gained at present by registration. Apart from improving the control over the practice of the midwife, it is essential in the interests of the expectant mother, particularly in rural areas, to bring the *dai* under supervision and to give her training. Rural authorities have not the financial resources for the provision of midwives in every village, communications are too precarious to permit of a centralised service and private practice would not provide a living wage even if midwives were available. At the same time, a large number of hereditary *dais* have already been trained either under official or voluntary auspices and new and better methods of training have been introduced. Training schools for *dais* have been established in Ajmer, Dera Ismail Khan and Silchar, and since these have obviated many of the drawbacks attendant on the practical training of *dais* attached to infant welfare centres, the present tendency is towards the establishment of additional schools. Voluntary associations, however, may well pause to consider the rôle of the *dai* in future organised midwifery services and her place in relation to the Registration Acts and the supervising authorities before embarking on further expenditure in this connection. The *dai* will no doubt be indispensable for many years to come, so that every attempt should be made to control as far as possible her methods of practice. This is perhaps impossible without registration, but the intentions of legislators in regard to her activities should be made more clear.

Maternity and Child Welfare.

42. Figures relating to the number of centres and the staff employed in these centres are incomplete, but approximately 800 infant welfare centres have been established, whilst some 60 medical women and 250 trained health visitors are employed in the maternity and child welfare services now in existence in this country. It is unfortunately true that a considerable number of the centres are badly organised, their work is un-co-ordinated, their records are not properly kept and the information which is collected is not made available for future planning. On the other hand, many have made satisfactory progress and their work must have had an effect both among women and children attending these centres. The numbers, however, are so small compared with the needs that large developments of the movement will have to take place before any appreciable influence on the maternal and infant mortality rates becomes apparent.

It will be of interest to give a brief summary of the scope and organisation of the work now being done in different provinces. In Assam, Bengal and Bombay, except for a grant-in-aid of *dais* training and health weeks in Bengal, the maternity and child welfare services outside the large cities are undertaken by voluntary organisations aided in a few instances by official grants. In the cities of Calcutta and Bombay voluntary and official schemes exist side by side, but municipal effort is directed to the provision of maternity homes and a midwife service almost to the exclusion of welfare work amongst nursing mothers and their families. Madras enjoys the distinction of being the only province employing a medical woman assistant to the Director of Public Health, but no grants-in-aid of local schemes are provided from provincial revenues and the absence of this stimulus to improvement has slowed down progress. The Madras Government gives an annual grant to the Indian Red Cross Society for the maintenance of the Training School for Health Visitors. The Punjab Government gives grants-in-aid for approved schemes and it also finances and maintains the Health School. The Superintendent of this School is also Inspectress of Health Centres. This is an excellent arrangement as far as it goes, but the better policy would be to place the organisation and administration in the hands of a medical assistant to the Director of Public Health and to limit the duties of the Superintendent to inspection of the work of the health visitors and midwives employed under the scheme. Difficulty is experienced in employing medical women in centres inspected by a health visitor. The Health School in the C. P. is a Government institution in charge of a medical woman who is also Director of Maternity and Child Welfare centres managed by the Indian Red Cross Society. A substantial annual grant is given from Government revenue to the Indian Red Cross Society for distribution. The advisability of this transfer of responsibility and control from the public health department is open to question. In the U. P. and in B. & O. the work is undertaken by voluntary associations which are given a semi-official status by the presence on the managing committees of Government officials and by Government and municipal grants-in-aid. In the U. P. organisation of the work is carried out by a medical woman employed by the Indian Red Cross Society. In B. & O. outside Patna inspection and direction are done by members of the committee. In Burma a qualified health visitor employed by the Indian Red Cross Society acts as Superintendent of the Health School and advisor on maternity and child welfare throughout the province. She works in close co-operation with the public health department, advises on the distribution of Government Grants-in-aid, and stimulates local effort.

Training of Doctors and Health Visitors.

43. Rules regulating the qualifications of medical women and health visitors appointed to maternity and child welfare posts have not yet been promulgated. Sufficient numbers have not been trained perhaps to warrant the universal application of such regulations, but in many areas a beginning could be made, primarily in the municipalities where permissive legislation already exists. A course of training for medical women graduates for a Diploma in Maternity and Child Welfare was inaugurated in the All-India Institute of Hygiene and Public Health in 1933. Only 4 candidates have so far passed out, because the conditions of subsequent employment are not sufficiently lucrative in comparison with private practice to attract any but the very few who are at present preventive minded. Posts carrying adequate salaries are scarce and it is therefore extremely difficult for medical women to gain the administrative and clinical experience necessary to fit them for posts as directors and organisers of larger schemes.

Health Schools for the training of health visitors exist in Bombay, Delhi, Lahore, Madras, Nagpur, Poona and Rangoon and schools are expected to open shortly in Calcutta and Lucknow. Sixty health visitors passed out from these schools in 1935. The numbers trained are insufficient to meet the demand, but the supply of candidates with the necessary education, experience and personality is limited. Qualifications for admissions, the curriculum, the standard of examination and the issue of diplomas is regulated by a voluntary society in Delhi, Madras and Poona and in other cases by official bodies. The drawbacks to the former arrangement become obvious when the question of reciprocal recognition of the diplomas by the Nurses, Midwives and Health Visitors' Councils is raised. Standardisation of training is difficult in a country so large as India, where the general education of women and the special education in nursing vary so widely, but the question must shortly be faced. The establishment of a central authority to inspect and approve of the curricula and standards of the teaching institutions should receive careful consideration.

Except in the schools at Nagpur and Poona the training is at present given in English, but there is a growing demand for vernacular courses and in view of the tendency to restrict the teaching in English in schools, as well as the educational qualifications demanded for admission to the training schools for nurses, the day may not be far distant when each province will find it necessary to admit vernacular students. The Lady Reading Health School, Delhi, continues to be an All-India Institution. The training there lasts 18 months and, in the course of time, when each province can supply locally trained health visitors, it is expected that this school will admit only superior grades of worker and provide training for higher supervisory and administrative posts. The training of workers is a duty which the Governments may reasonably be expected to assume and the maintenance of these schools under voluntary auspices, while allowing freedom for experiment and diversity of training, is not a measure the indefinite continuance of which can be regarded with undiluted satisfaction.

Illiteracy, widespread poverty and malnutrition, prejudice, superstition and adverse social customs, religious fatalism which precludes the taking of precautions and the low status of midwifery as a profession constitute serious obstacles to the spread of maternity and child welfare, but there are signs of hopeful augury even here. The demand for girls' education is growing and new schools are being opened every year. Broadcast talks reach a wide illiterate audience and, although this method lacks the stimulus of demonstration and personal contact, ideas are sown, some of which bear seed. Moreover, interest in the problems of nutrition has become widespread and advances in this direction may also be anticipated. Prejudice, custom and superstition are gradually yielding as education spreads, whilst improved communications and industrial developments widen the contacts between individuals of different habits and beliefs. The Nurses, Midwives and Health Visitors Registration Acts will do something to improve the status of midwifery. The enfranchisement of women and the growth of women's organisations has led to a demand for legislation for the suppression of immoral traffic, children's Acts, the protection of the industrial worker and a more humanitarian outlook which cannot fail to influence the march of events.

On the more technical side, the shortage of public health staffs, doctors, midwives and health visitors delays progress. Schemes are started and staffed with inadequately trained personnel who do not appreciate the aims and objects of maternity and child welfare nor realise their key position in public

health. The appointment of expert technical officers attached to the public health departments, who would supervise the junior staff, guide and direct the enthusiasm of voluntary bodies on scientific lines would to some extent remedy this lack of understanding and co-ordination, but here again the difficulty is that there are few administrative posts in which medical women can acquire the necessary experience.

One enquiry into the causes of maternal mortality will be carried out shortly in Calcutta under the Maternity and Child Welfare Section of the All-India Institute of Hygiene and Public Health but more research is urgently needed. Record keeping is practised in most welfare centres, but little or no use is made of the information collected, mainly because the staffs are insufficiently trained to appreciate the value of statistics and because few centres are under the control of a medical officer who could undertake the necessary analysis of the records. Despite these numerous obstacles, however, development is taking place and the outlook for the future justifies a moderate degree of optimism.

SECTION IV.

PUBLIC HEALTH ADMINISTRATION.

Administration.

44. *N.-W. F. P.*—The I. G., C. H. is *ex-officio* D. P. H. and has one A. D. P. H. The temporary post of second A. D. P. H. was abolished from October 1935. No public health staff for rural sanitation was maintained, but the vaccination staff consisted of 6 superintendents and 49 vaccinators, including 24 vaccinators for rural areas.

In urban areas, Rs. 11,820 was spent on public health staff. Only the towns of Peshawar and Kohat have whole time M. O. Hs. In the former, the Municipality contributes one-third of the cost of the officer who is provided by Government; in the latter the Municipality meets the whole cost. In Bannu, Dera Ismail Khan and Mardan sub-assistant surgeons carry out public health duties in addition to their other work. In 5 other towns, more or less similar arrangements exist, but 9 others have no health officers. A scheme for provincialisation of M. O. Hs. was under consideration, as the present part time arrangements have been found to be unsatisfactory. Only eight sanitary inspectors were employed in urban areas and of these 5 worked in Peshawar city.

Punjab.—The public health staff comprised the D. P. H., four Assistant Directors, Epidemiologist to Government, Superintendent, Punjab Vaccine Institute, 28 district M. O. Hs., 49 sanitary inspectors, including 8 employed by district boards, 10 sub-assistant health officers, 42 plague supervisors and dispensers and 441 vaccinators. Thirteen municipalities employed whole time M. O. Hs.; 30 towns used the dispensary medical officers as *ex-officio* M. O. Hs.; and 6 had part time M. O. Hs. In 7 towns the civil surgeons acted as M. O. Hs. in addition to their duties. 548 sanitary committees have been formed in villages. Other staff included 128 sanitary and health inspectors, 107 vaccinators, 6 inspectors of vaccination and 7 school medical officers.

Delhi.—The P. H. C. with the Government of India continued to act as *ex-officio* D. P. H. and he had an A. D. P. H. who also was M. O. H. of New Delhi Municipality and the Notified Area. The province includes two first class municipalities and 6 notified areas. Delhi city has a qualified M. O. H. In moffussal urban centres, the dispensary medical officers are employed as part time M. O. Hs.

For the rural areas, no M. O. H. was employed but the A. D. P. H. supervised the health work in addition to his other duties. The district board is generally responsible for the application of suitable health measures. The bye-laws applicable to rural areas, issued in 1927, were still in force.

U. P.—The superior staff included the D. P. H., four A. D. P. Hs., a part time public analyst, two deputy and assistant public analysts, and 72 Public Health Service officers. The subordinate public health staff comprised 50 officers of grade I and 43 of grade II.

D. P. H. . .	Director of Public Health.
A. D. P. H. . .	Assistant Director of Public Health.
I. G. C. H. . .	Inspector General of Civil Hospitals.
M. O. H. . .	Medical Officer of Health.
P. H. C. . .	Public Health Commissioner with the Government of India.
% . . .	Per cent.
P.M. . . .	Per mille.

Of the 48 districts in the province, 16 still have no sanitary inspectors or other health staffs and the civil surgeons act as part time M. O. Hs. In most of the remaining districts, one to three assistant or licentiate M. O. Hs. and 2 to 11 sanitary inspectors are employed. There are no school medical officers. The number of vaccinators employed in individual districts varied between 6 and 76.

In urban areas the position was still more unsatisfactory. In 27 districts only were municipal M. O. Hs. employed : in 27 small municipalities and 36 notified areas District M. O. Hs. were *ex-officio* M. O. Hs. Of these 21 held a D. P. H. and 13 were Licentiates. In six districts no sanitary inspector was employed, whilst in others the numbers varied from one to 16. Vaccinators numbered 185 ; school medical officers were at work in 13 districts.

The village-aid scheme referred to in previous reports continued to work wholly or in part in 7,973 villages. The scheme comprised the opening of dispensaries, training in hygiene, first-aid, anti-epidemic work and the improvement of water supplies. In each district under the district health scheme, one or more villages have been improved on sanitary lines to serve as models. A large number of wells on the pilgrim routes to Allahabad have been improved. The district board of Gorakhpur continued to provide funds for the appointment of resident health officers for groups of villages.

The Health Unit, Partabgarh, was continued with financial assistance from the Rockefeller Foundation. The activities of this Unit were reorganised ; the training of indigenous *dais* was pressed forward ; registration of vital statistics was improved ; trench pattern latrines in place of bore-hole latrines and soakage pit urinals were constructed ; other types of sanitary conveniences, *e.g.*, bathing platforms, were introduced and medical relief for minor ailments was given. In addition, the provincial Government were planning a programme of rural development with funds provided from the Government of India grant. The plan comprised (*i*) a main scheme which aims at the general economic improvement of villagers and village conditions ; (*ii*) departmental schemes of improvement in smaller selected areas in order to demonstrate the value of intensive work in particular directions. The main scheme was put into force in 72 villages in each of the plains districts and the Public Health Department collaborated in respect of public health improvements. Village officials, school teachers and older boys were being trained in hygiene and first-aid ; village sites were improved by the storing of rubbish, litter and manure in pits ; soakage pits for the reception of waste water and screened latrined trenches for women were constructed ; urinals were provided near inhabited areas ; villagers were trained in anti-epidemic work; indigenous *dais* trained in aseptic methods and village *chowkidars* in the identification of common diseases, and Junior Red Cross groups have been started.

Nine " modified " Health Units have been set up, each in charge of a district M. O. H. or a reserve officer of the provincial health service, the subordinate staff of each consisting of 3 sanitary inspectors, one health visitor, 6 midwives, 6 indigenous *dais* and 5 apprentice vaccinators. The cost of each unit is Rs. 11,000 ; its public health activities are mainly those of the main scheme.

B. & O.—In addition to the D. P. H., an A. D. P. H. was in charge of each of the three circles.

For school medical inspection, five officers of the assistant surgeon grade and five of the sub-assistant surgeon class for the civil divisions of the province were at work. A woman school medical officer for girls schools combined

this function with that of a Medical Inspector of Factories. An assistant surgeon was in charge of the Public Health Bureau and another was employed as chemical analyst at the Public Health Laboratory. For epidemic work sub-assistant surgeons were employed temporarily to assist local bodies. In addition 100 reserve vaccinators were placed on epidemic duty as and when required.

The rural health organisation continued to work in 12 of the 21 districts of the province, each of which had at least one qualified M. O. H. The M. O. Hs. of seven districts belonged to the provincial public health cadre and were paid by Government; in four others they were servants of the district boards, Government contributing half the cost of these district health organisations; in one other the board met the entire cost. The other districts maintained a nucleus staff which was expanded as required.

Only seven municipal towns employed M. O. Hs. In five cases these officers belonged to the provincial public health cadre and were paid by Government; the other two were paid from municipal funds.

Bengal Presidency.—Under the D. P. H four A. D. P. Hs. were in charge of circles. The rural health scheme continued to work satisfactorily in 25 districts. Each district was in charge of a M. O. H. with a subordinate staff consisting of trained sanitary inspectors and Assistant Health Officers.

As regards municipal areas, excluding Calcutta, 24 Health Officers and 101 sanitary inspectors, were employed.

C. P. & Berar.—This province still had only the nucleus of a public health organisation. In addition to the D. P. H., the superior staff consisted of the Superintendent of the Vaccine Institute, the Officer-in-Charge of the Public Health Institute, the Lady Superintendent of the Health School, and the leprosy specialist.

Civil Surgeons continued to act as district M. O. Hs. but they were assisted by 35 epidemic assistant medical officers and 237 dispensary assistant medical officers. The latter carried out sanitary duties within a radius of 5 miles of their dispensaries. Six sub-divisional medical officers and 5 assistants to civil surgeons were also given public health work. The posts of the two publicity officers having continued in abeyance, propaganda work was carried on by two dispensary assistant medical officers. In addition to the leprosy specialist, 17 trained assistant medical officers carried out anti-leprosy work. Local bodies employed epidemic staffs numbering 35 persons, 274 vaccinators and 36 assistant superintendents of vaccination. Rural uplift work was continued in four districts and 77 villages had sanitation committees.

Only three towns had qualified M. O. Hs.; in other urban areas only sanitary inspectors were employed. These numbered 56 and vaccinators totalled 81.

Bombay Presidency.—The Public Health Department consisted of the D. P. H., four A. D. P. Hs., the Director of the Vaccine Institute, Belgaum, and two officers in charge of the public health laboratories at Poona and Karachi. Subordinate staff included 31 inspectors of sanitation and vaccination and 420 vaccinators. Qualified M. O. Hs. were employed in eight towns. Four other municipalities employed medical officers holding the sanitary inspector's certificate and the B. Hy. of Bombay. In seven of the smaller towns, the health officers employed possessed minor qualifications of different kinds. 112 qualified sanitary inspectors were employed in 52 towns.

Only three districts employed M. O. Hs. The two sanitary boards at Siddapur and Shahpur Chakar functioned only in limited fashion, but useful work was done by 755 sanitary committees and village *panchayats*.

Madras Presidency.—The Public Health Department under the D. P. H. included 4 A. D. P. Hs., one woman Assistant Director, 58 first class Health Officers, 52 second class Health Officers, 314 health inspectors, 42 government vaccinators, 889 vaccinators employed by local bodies including probationers, one entomological assistant and two compounders. Three of the A. D. P. Hs. besides being in charge of the bureaux dealing with fairs and festivals, vaccination and vital statistics, respectively, were placed each in administrative charge of a group of districts. The woman Assistant Director since 1931 has been responsible for maternity and child welfare work; the need for this branch of public health has become increasingly appreciated by local bodies.

The quinquennial revision course for health and sanitary inspectors remained in suspense. Temporary posts of six assistant District Health Officers, two temporary units in the rural sanitation campaign and two temporary posts of health inspectors for anti-malaria work in the Vizagapatam Agency were sanctioned for another year. A Conference of Health Officers was held in July.

The six rural sanitation units were mainly engaged in controlling hookworm infection and the prevention of soil pollution. Their activities, as before, embraced surveys, educational propaganda, mass treatment and the construction of bore-hole latrines.

From the Government of India grant for rural amelioration a sum of Rs. 2·65 lakhs was allotted for the construction of latrines in rural areas. It has been planned to construct 200 public latrines in one *taluk* of each district.

The Poonamallee Health Unit was established as an experimental measure for intensive health work. The area embraces 25 villages with a population of 42,000. The staff consists of one first class M. O. H., 4 health inspectors, 4 health visitors and 8 midwives.

Assam.—The superior public health staff comprised, in addition to the D. P. H., two A. D. P. Hs., 7 temporary assistant surgeons, 9 urban M. O. Hs., 104 sub-assistant surgeons, 39 vaccination inspectors, 1 Biochemist, 4 compounders, 30 disinfectant carriers, 15 laboratory assistants and media makers, and 416 vaccinators, of whom 37 were employed by Government in hill districts, 377 by local bodies and municipalities and 2 by the Development Board. The services of the urban Health Officers who have undergone a course of training in sanitary science and who are employed by Government were lent free to municipal boards. Other boards were not bound to employ Government officers and two boards who formerly employed such officers have now appointed their own. Only the Shillong Municipal Board employed a fully qualified Health Officer, whose salary was in part paid by Government.

No rural health staff was employed, though a scheme for using the vaccination inspecting staff for this purpose has been pending for some years through lack of funds. General advisory work was, however, done by the general health staff, and dispensary officers were frequently invested with powers under the Pure Food Act. The Civil or Assistant Surgeon in charge of the sub-division was the Chief Health Officer of the Local Board.

Burma.—The superior staff included two Assistant Directors in addition to the Director of Public Health. Qualified M. O. Hs. were employed in four districts. Five assistant district M. O. Hs. were sanctioned but only 4 were actually employed. In other districts, the civil surgeon was in charge of public health duties in addition to his medical work. Other rural personnel comprised 63 public health inspectors, 303 vaccinators, 27 inspectors of vaccination, 27 epidemic sub-assistant surgeons as against a sanctioned strength of 22, one special leprosy officer and one sub-assistant surgeon on leprosy duty. In five districts no public health inspectors were employed.

Whole time M. O. Hs. were employed in 21 urban areas ; one officer was in part time service. Other urban staff included 20 medical registrars, 125 public health inspectors, 93 vaccinators, 20 persons on epidemic duty and 17 others. Fourteen of 28 towns with a population of over 10,000 and two with a population below 10,000 had wholetime health officers. Four registered medical practitioners obtained the Burma Government License in Hygiene at the Harcourt Butler Institute of Public Health. Five private candidates were under training at the Institute.

As in previous years, the activities of the Hlegu Rural Health Unit included the collection and study of vital statistics, health education, vaccination, school medical inspection, maternity and child welfare work. control of communicable diseases, refuse and sewage disposal, improvement of water supplies and abatement of nuisances. The birth and death rates were 36 p. m. and 20 p. m. as against averages of 17 p. m. and 13 p. m. for the quinquennium preceding the inception of the unit ; the infantile mortality of 125 p. m. of live births was the lowest on record. By the end of the year, nearly 68 % of the population had been vaccinated with the result that only seven smallpox attacks with one death occurred. There was only one non-fatal case of cholera. 247 infant and maternal welfare clinics were held ; the two midwives conducted 419 confinement cases. Of the 36 vernacular schools, 17 were provided with individual drinking water cups and properly protected water receptacles. Medical inspection of school children was carried out regularly. Leprosy clinics were continued and 34 new leprosy cases were registered. Leprosy surveys carried out in 27 villages showed an incidence of over 12 p. m. Chenopodium oil was administered to 2,453 cases for round worm infection ; of those for whom results were known 97% were relieved. Besides the distribution of *Gambusia affinis* as an anti-mosquito measure, 1,883 cinchona febrifuge tablets were distributed. Measures for the improvement of environmental sanitation were continued. Anti-rat measures included fumigation of burrows with cyanogas and trapping and poisoning of rats. 201 new bore-hole latrines were built. The Unit was also continued as a field training centre for students of public health and for M. O. Hs. and other public health staffs.

The Government of India gave a grant of Rs. 5 lakhs for the improvement of rural health conditions. The local Government have prepared a scheme of rural uplift centres in different parts of the province at a cost of Rs. 3,35,000. Under this scheme, each centre will comprise a typical group of villages and will have a staff of one M. O. H., one health visitor, one public health inspector and one midwife.

Medical Inspection of Schools.

45. *N.-W. F. P.*—Medical inspection of school children was carried out in 5 municipal towns by a Medical Inspector.

From July 1934 to June 1935, 46,369 examinations were made of 15,914 boys and of the 14,449 cases recommended for treatment, 10,604 or 73% actually received treatment. Thirteen per cent. of the children examined were found unclean ; 9% had external eye diseases ; 7% dental disease ; 2% ear, nose and throat affections ; 7% enlarged tonsils and adenoids ; 3% defective vision ; 1% malaria ; 3% enlarged spleen ; 2% anæmia ; 2% glandular affections ; 2% respiratory diseases. Of the 49 children found suffering from tuberculosis 32 had cervical glands, 10 had disease of the lungs, 3 of the spine, 2 of the ankle joint and 2 of other glands. Only 2 children were detected as unvaccinated and none needed revaccination. Nutritional disease was present in 206 cases, infectious disease in 12, goitre in 6 and general debility in 171. T. A. B. inoculations totalled 1,625 in Bannu, where an outbreak of typhoid fever was anticipated. 168 major and 1,242 minor operations were performed.

Owing to the distance of hospitals from the schools, common medicines, dressings, etc., were kept by scout masters, who issued them under the supervision of the medical inspectors. Mid-day meals were issued to children in 4 schools in Peshawar and Bannu.

Punjab.—A. D. P. Hs. and district and municipal M. O. Hs. continued to deal with sanitation in schools within their respective areas. The scheme of medical inspection of school children was in operation in five rural districts and in a fairly large number of urban schools. Diseases of skin, eye, teeth and enlargement of spleen were very common.

Delhi.—In addition to the supervisor for rural and urban school work, the staff comprised two whole time male sub-assistant surgeons, one whole time woman sub-assistant surgeon, two part time woman sub-assistant surgeons for urban areas and five part time sub-assistant surgeons for rural areas.

School premises and children were examined twice a year. Of the 28,818 boys and 5,965 girls examined, 99% and 28% were found to be suffering from different diseases. Among 24% of the boys examined trachoma was the cause of disease ; enlarged tonsils were found in 12%, defective vision 11%, malaria 10%, diseases of glands 8%, defective teeth 7%, throat diseases 4%, and other causes 5% ; 9% were unclean and 9% unvaccinated. Among the girls 9% had enlarged tonsils, 8% diseases of teeth, 4% trachoma and 3% other diseases. 55% of the boys in urban areas suffered from eye diseases and 17% from tonsillar affections.

U. P.—Only 13 municipalities employed whole time school medical officers. Examinations were carried out in 150 anglo-vernacular and 200 primary schools. In 20 other municipalities the M.O.Hs. acted as school medical officers and conducted detailed examinations in 45 schools and ordinary examinations in 161. In the rural areas, 21 M.O.Hs conducted detailed examinations in 43 schools and ordinary examinations in more than 8,100 schools.

B. & O.—Two Government medical officers carried out medical examinations of children in high schools and in certain middle schools. In addition a woman school medical officer was employed for girls schools. Ordinarily all new entrants were examined and a complete medical history of each child was recorded. All children who were found suffering from physical defects at the previous inspection were re-examined. Dispensary medical officers were required to record on the counterfoils of prescribed forms the treatment given and the result. Clinics have been opened in schools at the divisional headquarters.

Of the 11,166 boys examined, 6,212 or 56% exhibited defects, whilst defects were found in 78% of the girls examined. Amongst the boys enlarged tonsils, carious teeth, scabies and palpable neck glands were commonly found. Eye diseases constituted 3%, visual defects over 12%; heart affections 4% and enlarged spleen 4%. Several cases of leprosy were detected in the Orissa division.

The school medical officers lectured in hygiene, sanitation and epidemic diseases to senior students in the High English Schools. Attendance at 10 such lectures was compulsory for admission to the Matriculation examination. School and hostel buildings were regularly inspected, and arrangements made for physical exercises and games. The provision of cheap midday meals was reported to be working satisfactorily in Purulia.

Bengal Presidency.—In Calcutta the three medical officers of the Education Department, the medical officer of the Scottish Churches Collegiate School and other medical officers examined 7,980 children. Of these 81% were classed as well nourished or fairly well nourished and 19% as ill-nourished; 16·3% were poorly clad. Six per cent. of the students examined had skin disease; 13% defective teeth; 2% nasal disease; 15% enlarged tonsils; 2% adenoids; 10% glandular affections; 1% otorrhœa; 4% bronchitis and other lung troubles; and 1% showed defects in speech.

In municipal areas, 26 medical officers examined 8,102 children in 72 schools. Over 25% of these were ill-nourished and 16% were poorly clad. Whilst average height of these groups was not far below the anthropometric standard, the average weight was considerably below standard. Over 5% had skin diseases, about 10% defective teeth, 3% nasal disease, 4% enlarged tonsils, 9% lymphatic glands, 1% ear disease, 1% lung diseases, 1% defective speech, 9% eye troubles and 2% enlarged spleen; over 4% were unvaccinated.

Of the 2,146 children examined in rural areas in 54 schools, 32% were reported to be ill-nourished and 26% poorly clad. Six per cent. had skin diseases, 10% defective teeth, 14% enlarged spleen, 5% eye disease, 3% enlarged tonsils, 3% lymphatic glands, 2% ear disease, 2% nasal disease and about 2% adenoids, lung diseases and defective speech; 3% were unvaccinated. The rural sanitary inspectors inspected 5,595 schools in 25 districts and examined 172,032 children. About 26% had enlarged spleens and 10% were unvaccinated.

C. P.—Assistant medical officers in charge of dispensaries carried out the medical inspections. On an average 90,285 boys and 18,802 girls were examined each month. Of these 975 or 1% were found unvaccinated, 2,494 or 2% had enlarged spleens and 5,923 or 5% had contagious or other diseases. It cannot be assumed that the remaining 92% were healthy; rather does this figure indicate that detailed examinations were not carried out. In many schools, accommodation, lighting and ventilation were insufficient; many local board school buildings were in a dilapidated and dangerous condition and sanitary arrangements were unsatisfactory.

Bombay Presidency.—The scheme of medical inspection of schools continued in abeyance. In Sind inspectors of sanitation and vaccination visited 114 rural schools to examine the vaccinal state of the children and to inspect sanitation, ventilation and water supplies. They gave 82 lectures on tuberculosis and general hygiene. Of the 3,666 children examined, 265 or 7% were found to have enlarged spleens. In other registration districts similar work was carried out.

Madras Presidency.—A scheme for the revival of medical inspection of school children was under consideration of Government. More attention was devoted to the sanitary condition of schools especially in regard to water supplies and latrine accommodation after Government issued instructions to district health officers and health inspectors to visit recognised elementary schools, and report on the conditions of the premises, drinking water supplies, ventilation, lighting and sanitary conveniences as well as on the vaccinal state and general health of the children. A sanitary certificate was necessary from an officer of the Public Health Department before recognition was given to a privately managed school.

Assam.—Although no special staff for medical inspection work was employed, the A. D. P. Hs., because of other duties, were unable to devote attention to school hygiene. Periodical medical inspections of selected institutions were, however, carried out and recommendations for the improvement of health of the pupils and general sanitation of schools and hostels were made by the medical officers in charge.

Burma.—The Government's contribution to the "Scheme of School Hygiene and the systematic medical care of school children" remained in abeyance for the fourth year in succession with the result that medical inspection work was limited in extent; data are available for only 17 institutions. Of the 4,405 children examined, 59% were found to be protected against smallpox by primary vaccination and 37% by revaccinations; 2% had had smallpox and 2% were unvaccinated. The most common defects were carious teeth 21%, enlarged tonsils 14%, defective vision 5%, trachoma 4%, anæmia 3%, nasal obstruction 2% and skin diseases 2%. Satisfactory measures against epidemic diseases were taken in some schools.

Fairs and Festivals.

46. In the *N.-W. F. P.* all fairs passed off uneventfully; no fair of importance was held in the *Punjab* or in *Delhi Province.*

U. P.—In those districts having a health service, the medical and sanitary arrangements of all fairs and religious gatherings were controlled by the district health staff. The *Magh Mela,* the most important event of the year, was held in January/February, the attendance numbering nearly ten lakhs. The inspection of pilgrims coming by rail and by road and all conservancy arrangements were organised by the A.D.P.H. in charge of the Range. Temporary regulations under the Epidemic Diseases Act were enforced in the *mela* area and in Allahabad. The general health of the pilgrims was excellent except for seven cases of cholera in the *mela* area, of which 5 were imported. In order to prevent further spread of the disease, contacts were medically treated and inoculated. Four imported cholera cases, with one death, were reported in the *Piran-i-Kaliar* fair at Roorkee.

B. & O.—The most notable events were the Sonepur fair, held in November, the *Snan* and *Rathjatra* festivals held in June and early July and the *Pitripaksh mela* in Gaya. Only 9 cases of cholera with 3 deaths were reported during the Sonepur fair. Although Puri district was heavily infected with cholera, only 44 cases with six deaths were reported in the *mela* areas of the *Snan* and *Rathjatra* festivals, at which over a lakh of pilgrims were present. Only one case of cholera occurred during the *Pitripaksh* fair, which was attended by 67,442 pilgrims.

Bengal Presidency.—At the *Rathjatra mela* in Hooghly district a few cases of cholera were recorded; at Gangasagar *mela* there were 15 cases with 5 deaths; at the Nangalbundh *mela* in Dacca distt. 2 cases of cholera; and at the Dalalbazar *Jhulan mela* in Noakhali district 2 cases of cholera.

Outbreaks of cholera were also reported in the Patiram fair in Dinajpur district and in the Chittagong Hill Tracts on the occasion of the Chamka Chief's installation. At the former no deaths were recorded but at the latter 27 deaths occurred.

C. P.—An outbreak of cholera occurred at Bhandakpur fair, Saugor district, but other fairs passed off uneventfully.

Bombay Presidency.—Ten cases of cholera, with 7 deaths and 2 cases of smallpox were recorded at the Pandharpur fair. During the Kartiki festival at Alandi 9 cases of suspected cholera were removed to hospital. No infectious or epidemic disease was reported from other fairs.

Madras Presidency.—Of the 620 festivals which were held, 490 took place in the first half and 130 in the latter half of the year. Sanitary arrangements as usual were supervised by district and municipal M. O. Hs. or health inspectors. Except for some imported cases of cholera, all the fairs, including the important *Ardhodayam* festival, which is held once in 30 years, passed off without incident.

Assam.—At none of the fairs did the attendance exceed 10,000 and no outbreak of epidemic disease occurred.

Health Propaganda.

47. *Punjab.*—The staff of the Epidemiological Bureau, in addition to organising health exhibitions and health dramas, gave a large number of demonstrations to post-graduates, to medical students, to health visitors and to the sanitary inspector classes. Broadcasts were given on vaccination, plague, c.s. fever, hookworm, quinine, personal hygiene, insect enemies of man, tuberculosis and leprosy. In rural areas M.O.Hs. gave lectures on health topics to the general public and to school children and at fairs and other large gatherings.

U. P.—The Hygiene Publicity Bureau was staffed by an A.D.P.H. and two assistant publicity officers. The equipment of the Bureau's cinema van was enlarged to include a cinema projector, loud speakers, records on rural development and epidemics and 4 additional model boxes on maternity and child welfare. By means of the van 107 demostrations were given to audiences numbering about 55,000. Intensive demonstration work was also carried out in nine districts. Magic lantern demonstrations were given by the assistant publicity and reserve officers particularly in epidemic areas. Other health staff gave 1,017 demonstrations and 50,000 lectures to audiences numbering about 23½ lakhs. 1,645 lectures were delivered by a number of dispensary medical officers. In Garhwal district, the public health and medical staffs gave 2,196 lectures and 21 magic lantern demonstrations on epidemic diseases to pilgrims going to Badrinath and Kedarnath and other centres. Leaflets on cholera, flies, smallpox, etc., were also distributed to these pilgrims. Bullock carts equipped with locally-made models and with health posters and literature toured in the interior of three districts.

The Publicity Bureau prepared sets of slides on "rural development", on meningitis and on the pilgrim route to Badrinath and Kedarnath. Various health booklets and leaflets in English, Urdu and Hindi were prepared and distributed in rural areas, and posters on plague, smallpox, malaria, child welfare and cholera were redesigned. More than 100,000 leaflets, 5,500 booklets and 3,500 sets of posters were distributed throughout the province. Lectures and demonstrations on methods of hygiene publicity were given by the Bureau staff to post-graduates and post-licentiates at the Provincial Hygiene Institute.

The 3,057 Junior Red Cross groups had a membership of 83,391 divided between 2,366 schools. The activities of these groups embraced the organisation of fresh air camps in villages, first-aid, sanitation of schools and hostels.

B. & O.—The provincial public health bureau prepared a series of ten illustrated posters on rural sanitation and supplied 500 copies to local bodies. It also sent out a large number of pamphlets and leaflets for distribution at the exhibitions held at fairs and festivals. Special health sections were organised at the provincial exhibitions at Patna and Daltonganj. Illustrated lectures and demonstrations on health subjects were given at Sonepur fair and to the cadets of the Police Training College, Hazaribagh. Hygiene lectures and magic lantern demonstrations formed part of a special course organised at Patna for the training of Co-operative Society Inspectors. Articles were contributed to the press and Hindi translations of two health pamphlets were prepared and widely distributed. The A.D.P.Hs. gave short lectures on sanitation and hygiene during their inspection tours in rural areas.

The Red Cross Health Museum as usual did useful health publicity work whilst the anti-tuberculosis sub-committee of the Indian Red Cross Society continued to direct campaigns against the spread of tuberculosis.

Bengal Presidency.—The ten touring cinema parties held 1,680 demonstrations, 280 on malaria, 237 on cholera, 341 on maternity and child welfare and 127 on tuberculosis, which were attended by 964,305 persons. The same staff also assisted in about 100 exhibitions in the muffassal and 30 in Calcutta. One of the cinema parties toured with the Government exhibition van which was fitted with exhibits, a cinema outfit, a magic lantern, amplified radio, microphone, etc. The van visited three districts and held 84 exhibitions before audiences estimated at 2 lakhs. About 60,000 leaflets and 20,000 posters were distributed. Six new films were prepared.

C. P.—In rural areas health propaganda by the epidemic staff included lectures at schools and in villages illustrated by coloured charts and pamphlets.

Bombay Presidency.—Propaganda on maternity and child welfare was continued by the 17 Sanitary associations. The Broach Sanitary Association organised 48 magic lantern and other lectures. Five health shows were held, cinema films on the subjects of child welfare and campaign against tuberculosis were shown and leaflets and posters were distributed. The Bombay Association arranged lectures for the occupants of insanitary chawls in the city. The Ahmedabad and other Associations carried on similar activities.

Madras Presidency.—The propaganda section in the Office of the D.P.H. maintained propaganda material for supply to local bodies and others on demand. Leaflets, pamphlets and posters were sold and magic lantern slides and cinema films issued on hire. Leaflets and posters on 110 different subjects have so far been issued in English and other vernaculars. 776,863 copies of these and 3 copies of a leprosy film were sold. Other activities included 19,948 magic lantern lectures, 151,811 other lectures, 1,253 cinema shows and 1,010 health dramas, attended by nearly 81 lakhs of persons. The propaganda section also organised an exhibit during the Christmas Park Fair exhibition at the South Indian Athletic Association ground.

Assam.—Assistant surgeons of the Public Health Department during their inspection tours gave demonstrations and illustrated lectures on different health subjects.

Burma.—The staff of the Hygiene Publicity Bureau distributed 20,208 leaflets and posters, and gave 46 ordinary and 52 lantern lectures and 78 cinema demonstrations on health subjects to audiences estimated at 50,385 in 16 towns and 52 villages. A publicity campaign, mainly directed against plague and cholera, was intensively conducted in epidemic areas. An additional copy of the Rockefeller Foundation malaria film with Burmese captions was prepared, as were two new pamphlets. The number of leaflets cards, specimen lectures, hand bills and posters distributed by the Bureau aggregated 567,679. There was increasing demand from local bodies, public institutions and voluntary welfare organisations for literature on health subjects, for the loan of the Red Cross Society's health exhibits and for the services of the Hygiene Publicity Officer. The health staffs gave 9,337 talks in rural and 1,139 in urban areas, and 250 and 152 magic lantern and 4 cinema demonstrations to audiences estimated at 733,120 and 125,300, respectively ; they also distributed 109,407 and 183,650 copies of health publications.

Under the auspices of the Burma Branch of the Indian Red Cross Society, two health weeks and exhibitions were held in Rangoon. School competitions for the best health essays and posters were held in connection with the health week and exhibition. These formed a special feature of health publicity work in this province.

Industrial Hygiene and Mines.

48. The daily average number of persons working in and about mines regulated by the Indian Mines Act, 1923, was 253,970. Of these, 129,381 worked under-ground, 59,882 in open workings and 64,707 on the surface. The numbers of women included in these categories were 9,551, 14,193 and 16,159 respectively.

The general health of the mining populations in the Jharia and Raniganj Mining Settlements in B. & O. and Bengal was on the whole satisfactory. Inspections were made by medical officers, as *ex-officio* inspectors of mines, in B. & O., Burma, C. P., Madras and in the Punjab. In Bengal similar inspections were made by the Chief Sanitary Officer to the Asansol Mines Board of Health and in Assam by the civil surgeons of Lakhimpur and Naga Hills.

Classes in first-aid were held at 11 centres in the Jharia coalfield and in the mining areas of Singhbhum and Sambalpur. Of the 169 persons who attended the classes, 117 were awarded certificates. In the Raniganj coal-field, classes were held at 5 centres ; 116 persons attended, 111 completed the course and 92 were awarded certificates. Similar classes were also held at other important centres.

The Asansol Mining Settlement.—The public health administration of the Asansol Mining Settlement continued to be in charge of a Board of Health with an executive Chief Sanitary Officer.

The birth and death rates were 21 p. m. each. The decrease in the recorded infant mortality rate from 169 to 147 per 1,000 live-births was reported to be due to strict supervision by health visitors and a lesser incidence of malaria. The fever mortality also declined. Of the 3,045 recorded fever deaths only 96 were due to malaria. Cholera appeared in epidemic form in March, reached its peak in July and August and subsided towards the end of the year. During this epidemic 1,144 cases with 616 deaths were recorded. An unusual shortage of water supply, due to deficient rainfall in 1934 and delayed rains in 1935, was said to be responsible for the prolonged duration of the epidemic. The settlement is however, constantly exposed to imported infection because of the frequent migration of labour whilst the movement of the miners themselves within the Mining Settlement largely determined the route of the spread of infection. Preventive measures included the application of the provisions of the cholera regulations, 104,751 anti-cholera inoculations and other routine measures. The question of providing the more important parts of the coalfield with a piped water supply was engaging the attention of the authorities.

Only 20 deaths were due to smallpox. Vaccinations totalled 43,944, primary 14,642 and revaccinations 29,302. Temporary smallpox regulations were enforced. Travelling health exhibitions and baby shows were organised in 8 places.

The leprosy campaign was continued, the staff being provided by the Mining Board of Health, whilst the B. E. L. R. A. (Indian Council) maintained 11 leprosy clinics. Twelve trained health visitors were appointed by the B. E. L. R. A. for detailed surveys, educative propaganda and home visiting. A "leper day" was organised.

Jharia Mining Settlement.—The health and medical administration of this settlement, including neighbouring mining areas and extending over 787 sq. miles, is entrusted to a Board of Health which employed a chief medical officer.

The estimated population of the Jharia Mining Settlement was 544,539. The birth rate was 27 p.m.; the death rate 20; and the infantile mortality rate 102. Along with other parts of B. & O., this coalfield suffered from an outbreak of cholera, the cases and deaths numbering 983 and 447 respectively, but the deaths on the collieries alone numbered only 42. A total of 26,437 anti-cholera inoculations were done. There were 1,186 cases of suspected smallpox with 58 deaths. The system of underground drainage was further extended. A total of 178 collieries have now been connected to the Water Board mains.

The Board maintained a laboratory which examined 445 food samples. All the collieries have been required to remodel one-fifth of their non-standard houses to the Board's standard. Health propaganda was done in connection with leprosy, maternity and child welfare, general hygiene, sanitation and ventilation. There were 16 maternity and child welfare centres under 3 qualified health visitors. A fully equipped anti-leprosy centre was opened, in addition to the three leprosy clinics at Jharia, Katras and Dhanbad.

Factories Act.—In regard to factories, the most important new feature was the enforcement of the Factories Act, 1934, from 1st January 1935. This Act, *inter alia* provided for (*i*) reduction of the maximum weekly working hours for adults, women and children, (*ii*) the protection of workers against

serious discomfort due to high temperatures in factories (*iii*) tests of stability of factory buildings, etc., and (*iv*) protection from industrial disease. Further provisions for welfare have been incorporated. Registered factories actually at work totalled 8,831, of which 5,166 were perennial and 3,665 seasonal. The average number of operations was 1,610,932. Accidents numbered 23,119, including 207 fatal, 4,831 serious and 18,081 minor.

With regard to housing, the following paragraph has been taken from the Report on the working of the Factories Act for 1934 :—

"In Madras, housing accommodation was provided in one more factory. In the Punjab, considerable progress in the quality and quantity of housing provided took place in the bigger mills and newly erected factories and there was also some progress in smaller industrial concerns. In Bombay, the Labour Union, Ahmedabad, completed 20 more tenements on the tenant ownership basis during the year. Each tenement provides two rooms, a kitchen, a verandah and a yard. The standard of these tenements is higher than that of those usually occupied by textile workers and tenants will become owners in 22 years. 435 tenements have been built by the Ahmedabad Mills Housing Society in the last two years and 304 of these are occupied. It is understood that the Calico Mill, Ahmedabad, has initiated a very extensive building scheme which will enable a large proportion of the labour to be suitably housed. In Bengal, as a result of better trade conditions, a large number of factories are in a position to pursue their policy of improving year by year the housing accommodation provided for their workers. The improvements effected during the year consist of the replacement of old and unsuitable houses by new ones of better design, extensions and repairs to existing houses, additional tube wells and better arrangements for the supply of drinking water, and the provision of bathing places and recreation grounds. In Delhi, the Government of India Press, and the Kilokri Pumping Station have provided housing for the majority of their workers. In the U. P., 602 additional quarters were constructed during the year. Sugar factories were responsible for the bulk of the new construction. The Cawnpore Improvement Trust also built 60 quarters each consisting of two rooms, a courtyard and latrine and 8 quarters each consisting of a room, a verandah, kitchen and latrine on the ground floor and a room on the first floor with a covered stair case leading to it. Reference was made in last year's report to the acquisition of 40 acres of land by a mill in Cawnpore, for the purpose of building a model settlement to accommodate 10,000 workers and their families. It is now learnt that the actual transfer of land has not yet taken place and the scheme has consequently been blocked. The position of housing in the C. P. and Burma is much the same as in previous years."

The health of employees was generally good, whilst water supplies and sanitary arrangements were on the whole satisfactory. In the C. P., U. P. and B. & O. the disposal of effluents from rice and sugar mills presented a difficult problem. In Bombay the problem of the disposal of trade waste at Ahmedabad was likely to increase with the tendency to develop machine bleaching. In Assam, Bengal and the Punjab, there was still room for considerable improvement in sanitation, particularly in the smaller concerns.

Ventilation and humidification received considerable attention in the Ahmedabad and Sholapur textile mills in which nearly Rs. 60 lakhs have been spent on the improvement of working conditions. Progress was made in providing air conditioning plants in the Bombay Mills and the question of dust removal in the metal stamping and polishing industry also received attention.

The Delhi Cloth Mills management engaged a fully qualified woman doctor for the hospital. In the Birla Mills, a hospital with a fully qualified doctor and a first-aid clinic was provided. Crêches did not appear to be popular with the operatives, but in Bengal welfare centres continued to do useful work. Improvements and extensions have also been made in the crêches in Ahmedabad and Bombay. Thirty-one health exhibitions for mill workers were held, 15 in Bombay, 10 in Ahmedabad and 6 in other places.

U. P.—District and municipal M. O. Hs. were *ex-officio* inspectors of factories. Experiments in regard to the efficient disposal of molasses and effluents from sugar factories were being carried on by the Sugar

Technologist at the Harcourt Butler Technological Institute, Cawnpore. To provide for immediate requirements, factory rules and byelaws have been amended making factory owners responsible for the proper disposal of molasses and the maintenance of their factories and surroundings in a sanitary condition.

Bengal Presidency.—The installation of septic tank latrines and activated sludge plants for 23 factories were approved. Samples of 1,056 effluents were analysed in the Bengal Public Health Laboratory whilst 651 samples of chlorinated effluents were tested on the spot for residual chlorine.

Madras Presidency.—Both district and municipal M. O. Hs. were additional Inspectors of Factories. The statutory provisions in the Indian Factories Act and the rules framed thereunder by the Provincial Government were supplemented by certain sections in the District Municipalities and Local Boards Acts in the case of certain factories, workshops and work places which do not come under the Factories Act.

Assam.—Sanitary conditions on tea estates were, on the whole, satisfactory. Special regulations under the Emigration Labour Act, 1932, existed in regard to the supervision of sanitary conditons on these estates. Sanitation of factories and control of offensive trades were effected under the Indian Factories act. A. D. P. Hs. were additional Inspectors of Factories.

Adulteration of Food.

49. *N.-W. F. P.*—The Punjab Pure Food Act, 1929, as applied to this province, and the rules made thereunder by the provincial Government were in force in all municipalities and notified areas except Nowshera. Food stuffs such as milk, *ghee*, *atta*, tea, etc., were inspected by the food inspectors in these towns ; only those suspected of adulteration were sent for examination to the provincial health laboratory. The A. D. P. H. acted as public analyst.

One hundred and forty-six samples were examined, *atta* 4, milk 28, *ghee* 105, tea 2, mustard oil 1, and 6 of *gur*. Of the *ghee* samples, 41 % were found adulterated and 64 % of milk samples.

Punjab.—The total number of samples analysed at the Public Health Chemical Laboratory was 635, including water 204, *kankar* lime 59, milk 109, *ghee* 111 and miscellaneous 152 ; 45 % of the *ghee* and 60 of the milk samples were found below standard. The Public Health Chemist was employed by 27 local bodies as their public analyst. Three candidates admitted last year for training as Public Analysts were awarded certificates on the completion of the 6 months course.

A standard for mustard oil was worked out after examination of samples from different jails and was notified by Government under the Punjab Pure Food Act. Drafi regulations for the sale and labelling of condensed milk were framed.

The Public Health Chemist, besides conducting experiments on chlorination of water, prepared 690 gallons of chlorine solution in the chloronome.

Delhi.—Four samples of milk and 2 of *ghee* were analysed, in addition to the usual bacteriological and chemical examinations of water.

U. P.—The U. P. Prevention of Adulteration Act was in force in 85 municipalities, 6 districts, 32 notified areas and several rurul and town areas in 24 districts. Of the 7,896 samples analysed, 4,572 were *ghee*, 1,983 milk, 1,027 edible oils, 100 flour, 40 butter and 174 miscellaneous. Adulteration was discovered in 904 samples of *ghee*, or 15 % ; 410 of milk, or 7 % ;

322 of edible oils, or 5 % ; 25 of flour ; 16 of butter ; and 36 miscellaneous.

B. & O.—Chemical and bacteriological examination of 2,847 articles were carried out in the provincial Public Health Laboratory. Water samples totalled 1,097, food 1,740, *ghee* 679, mustard oil 851, sweets 74, milk 83, *atta* 26 and 24 miscellaneous ; 58 % of the *ghee* samples, 38 % of mustard oil, 70 % of sweets and 59 % of milk were found adulterated.

Bengal Presidency.—In the Bengal Public Health Laboratory 7,341 samples of food articles were analysed. The results are given below :—

	District Board.		Municipal	
	No. analysed.	Per cent. adulterated.	No. analysed.	Per cent. adulterated.
Mustard Oil . . .	3,315	32	916	38
Ghee	565	45	644	45
Milk	273	66	224	66
Atta and wheat flour .	174	5	114	2
Tea	100	19	55	25
Chhana . . .	44	11	..	..
Dahi	59	93	" 25	40
Butter . . .	2	..	4	78

The D. P. H. remarks :—

" The adulteration of milk and milk products which are the most important food articles in Bengal has not yet been controlled to any appreciable extent by action hitherto taken by the local bodies under the Bengal Food Adulteration Act whereas adulteration of *atta* and tea appears to have actually increased. Seizure of food articles under the law must, therefore, still considerably increase before any satisfactory check on adulteration can be expected and the increasing analytical work can be dealt with by the establishment of a public health laboratory in every district ".

The 4,648 samples of food stuffs analysed in the Dacca Branch Public Health Laboratory included mustard oil, 2,228 of which 42% showed adulteration, milk 1,055 and 50%, *ghee* 532 and 50%, *dahi* 74 and 81%, *atta* and wheat flour 24 and 8%, and tea 15 and 7%. The Darjeeling Municipal Laboratory examined 840 samples of food articles, *viz.*, milk 514, butter 38, *ghee* 78 and mustard oil 202. Adulteration was found in 11% of the milk samples, 23% of butter, 6% of *ghee* and 1% of mustard oil samples.

C. P.—The Public Health Institute, Nagpur, analysed 13 samples of butter, of which 12 were found adulterated ; of 20 milk samples 5 were adulterated ; and 24 out of 27 *ghee* samples.

Bombay Presidency.—The Bombay Prevention of Adulteration Act, 1925, was in force in the towns of Karachi, Ahmedabad, Surat, Broach and Shikarpur and samples of food stuffs from these towns examined by public analysts numbered 2,216, 871, 252, 149 and 133, respectively. The public health laboratories at Poona and Karachi and the municipal laboratory at Ahmedabad continued to carry out bacteriological and chemical tests of water samples.

Madras Presidency.—The prevention of Adulteration Act was in force in 57 local areas. Of the 6,833 samples analysed, 1,864 were found adulterated. The most commonly sampled foods were *ghee*, milk, butter and gingelly oil. Gross adulteration of milk, *ghee* and butter was still in evidence. Adulteration of *ghee* was completely prohibited under rules issued by Government.

Coorg.—No Act or rules exist which deal with the prevention of adulteration of milk and *ghee*.

Assam.—Of the 1,900 samples examined in the Public Health Laboratory, 331 showed adulteration. Of the milk samples 43%, *ghee* 52%, mustard oil 43%, flour 50%, and tea 28% were found adulterated.

Burma.—Of the 79 samples of *ghee* from Rangoon examined in the Chemical Examiner's laboratory 15 were adulterated. In the chemical section of the Sir Harcourt Butler Institute, 425 samples of foods and drugs were examined. These included *ghee* 159, mustard oil 72, rice 88, milk 42, and 64 miscellaneous. Adulteration was found in 18% of the *ghee* samples, 59% of mustard oil, 11% of rice and 57% of milk samples.

Railways.

50. (*i*) *Bombay, Baroda and Central India Railway.*—The Medical administration under a Chief Medical Officer comprised 7 district medical officers, 23 assistant surgeons, 47 sub-assistant surgeons, 2 matrons, 6 nursing sisters, 6 nurses, 59 dispensers and one anti-malaria inspector. In addition, six civil surgeons and three State medical officers were subsidised for medical services rendered to the railway staff.

Out of 354,108 new cases treated in hospitals and dispensaries during 1935-36, causes of sickness were classified in respect of 351,767 cases. These included airborne diseases 52,624, food and water borne diseases 39,778, insect borne 66,497, infectious diseases 977, pyrexia of uncertain origin 14,003, diseases of direct contagion 861, food deficiencies 206, injuries 26,454 and other causes 150,367. Enteric fever was responsible for 189 cases, influenza 9,151 and rheumatic fever 97. Cholera was the cause of 7 cases with 2 deaths; plague was absent. Of the 238 cases and 17 deaths from smallpox, 93 and 1 occurred among the vaccinated and 145 and 16 among the unvaccinated. Six cases of C. S. fever with one death occurred. Surgical operations numbered 14,092. Arrangements for X-ray examinations and anti-rabic treatment were provided at Ajmer; 183 cases of dog bite were treated with one death. 3,426 primary and 2,063 revaccinations, 101 T. A. B. and 1,394 anti-cholera inoculations were performed. Routine anti-malarial measures were continued.

Thirty-eight first-aid training classes were held and 326 of the 550 candidates obtained certificates, 11 vouchers, 7 medallions and 1 label. Ten were trained in home nursing.

(*ii*) *Madras and Southern Mahratta Railway.*—Of a total of 327,817 cases treated in the medical institutions during 1935-36, malaria was the cause in 7,162, dysentery 6,406, diarrhœa 5,989, typhoid fever 193, measles 163, smallpox 114, cholera 33, plague 12 (all in Hubli), accidents 13,985 and other causes 293,760. Anti-cholera and anti-plague inoculations numbered 18,584 and 1,829; vaccinations totalled 5,907.

Chlorination of water supplies was usually carried out with stabilised bleaching powder, but a standardised method of purification of water supplies was being evolved. General sanitation was satisfactory. The new conservancy rules were expected to improve present methods for disposal of nightsoil and sewage. The disposal of effluents from septic tank systems in larger stations was becoming more difficult to arrange and borehole latrines have been built as an experimental measure. Sanitary committees continued to function at certain larger stations. Of the 648 candidates attending the first-aid class, 514 appeared in the examination and 368 passed.

(*iii*) *South Indian Railway.*—The medical organisation comprised six officers, 8 assistant surgeons, 37 apothecaries, 31 compounders, 21 matrons, nurses, ward attendants, *dais*, etc., and 2 sanitary inspectors.

General health conditions were satisfactory and the number of days and certified sickness fell by 11 %. Total cases treated fell by 15 % to 29,563 ; these included 13,163 for infectious and 13,384 for systemic, 2,459 for general and local and 535 for other general diseases ; 22 labour cases were dealt with. The total loss from sickness was 199,045 days or an average of 7 days per case. Deaths numbered 134 the equivalent of a rate of 5 per 1,000 sick. Influenza was responsible for 4,447 cases and the number of days lost through this disease was 20,965. Cases of dengue numbered 70 ; rabies 78 ; cholera 43 with 16 deaths ; smallpox 121 with 7 deaths ; and malaria 1,906, of which 1,114 were recorded in the Southern district. Malaria cases were treated with atebrin, plasmoquine and cinchona febrifuge. Plague was again absent. Vaccinations numbered 489. Investigations were continued into chronic bowel diseases and the general ill-health connected with these conditions. Arrangements for Kahn's test for syphilis cases are provided at Golden Rock, where an actino-therapy, diathermy and X-ray room was opened.

Sanitation was on the whole satisfactory, as were also conservancy and water supply arrangements during festivals. The water supplies of 20 large centres were analysed periodically.

The Railway maintains five hospitals which treated a total of 1,846 in-patients with 20 deaths. Expenditure on medicines amounted to Rs. 27,266 and on surgical appliances and stores to Rs. 3,988. Nine officers and 91 subordinates were granted first-aid certificates. Medical examination of school children was continued.

(*iv*) *Great Indian Peninsula Railway.*—This Railway spent Rs. 5,98,007 on the maintenance of its medical organisation and Rs. 4,07,546 on its health services. These comprised a Principal Medical and Health Officer, 7 district medical officers, 5 assistant medical officers, 17 assistant surgeons, 39 sub-assistant surgeons, 2 matrons, 23 nursing sisters, 6 nurses, 3 health assistants, 21 sanitary inspectors, 1 anti-malaria overseer, 47 dispensers and 40 anti-malaria coolies.

A total of 189,339 cases were treated at the various medical institutions ; the number of days of certified sickness totalled 732,814 and the loss on this account amounted to Rs. 12,09,061. The more important causes of sickness were malaria 8,163 cases, other fevers 15,702, influenza 7,090, venereal diseases 866 (gonorrhœa 401, soft sore 91 and syphilis 374), tuberculosis of the lung 158 and 51 cases of enteric fever. Only a few sporadic cases of plague occurred. Cholera was responsible for 28 cases with 19 deaths among employees and 50 and 23, respectively, among families. The medical staff performed 18,301 anti-cholera inoculations. Smallpox accounted for 54 cases with 3 deaths among employees and 577 and 47 among families. A total of 9,302 persons were vaccinated. Anti-rabic treatment continued to be provided at Byculla, Bhusaval and Jhansi and 224, 69 and 142 cases, respectively were treated.

Birth and death rates in the railway population were 11 p.m. and 5 p.m. and the infantile death rate 232 per 1,000 live-births. The Bhusaval infant welfare and maternity centre continued to do useful work.

First-aid equipment boxes at railway stations and in trains were maintained in good order. Forty-three classes in first-aid were held at 25 centres and 504 candidates were given training ; of these 286 obtained certificates, 13 vouchers, 5 medallions and one label.

SECTION V.

MEDICAL INTELLIGENCE AND INTERNATIONAL HEALTH INCLUDING PORTS.

Epidemiological Intelligence.

51. The office of the Public Health Commissioner continued to act as the epidemiological bureau of the Government of India. Epidemiological information is issued in a series of weekly and monthly statements and bulletins of which three are published in the *Gazette of India*. Details of these will be found in previous reports.

Office International d'Hygiene Publique, Paris.

52.(A) Lt.-Colonel G. G. Jolly, C.I.E., I.M.S. acted as delegate for India at the meeting held in April/May 1935. The delegate's report to the Government of India was printed and circulated to all concerned so that it is unnecessary here to do more than mention a few of the more important points. The greater part of the business was as usual transacted by Commissions and the delegate for India was a member of the Quarantine, Aerial Navigation, Yellow Fever and Opium Commissions.

The Quarantine Commission dealt mainly with questions of principles in connection with individual cases. These included (*a*) the demand of bills of health by certain countries which had neither signed nor ratified the Convention. Representations on the subject to those countries were considered out of order; (*b*) excessive sanitary dues or taxes: it was agreed that the "Office" should not refer to the practice of individual countries in dealing with such points, although delegates might be asked to take up the points with their Governments; (*c*) infractions of quarantine regulations: the Argentine Government complained that two ships, the S. S. "Springbank" and S.S. "Nairnbank" which had been granted deratisation exemption certificates at Calcutta were found on arrival at Bahia Blanca and Rosario to be heavily infected with rats. Pending receipt of information from the Government of India, the President, while recognising that there was no question of amending the Convention, emphasized that countries must be careful not to give certificates of exemption without a previous careful inspection. The delegate for India undertook to report the alleged facts to his Government with a view to necessary enquiries being made; and (*d*) conveyance of infected fleas in merchandise. Although the restrictions on the import of jute bags had been withdrawn after representations had been made and the Peruvian Government were unlikely to re-impose these, the IXth Pan-American Sanitary Conference held at Buenos Ayres in November, 1934, expressed the opinion that further investigations were required in respect of the possible carriage of plague by infected fleas in merchandise. The Commission decided that the Government of India should be asked to conduct an investigation into the survival of infected rat-fleas with special reference to the nature of the cargo, the duration of the voyage, temperature and humidity.

The Yellow Fever Commission considered a number of important communications including a note on 'A Survey of Aedes Mosquitoes in Bombay and the measures suggested for their control' by Dr. R. K. Mhatre communicated by the delegate for India. The latter also invited the attention of the

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Abbreviations—

I. S. C.	International Sanitary Convention.
P. H. O.	Port Health Officer.
D. P. H.	Director of Public Health.
A. D. P. H.	Assistant Director of Public Health.

Commission to the Resolution on this subject passed by the twelfth Research Workers Conference.

Three main questions emerged from these communications. These were (*a*) the specificity of the mouse protection test (*b*) viscerotomy and (*c*) anti-amaryl vaccination. The Commission reaffirmed its conviction regarding the value of the mouse protection test ; it was of the opinion " that viscerotomy constitutes a very important means of investigation " and urged " that this method of viscerotomy should be applied as widely as possible in all countries in which the presence of yellow fever may be suspected ". In regard to anti-amaryl vaccination the Commission recommended the continuance of research and pointed out again the necessity of following up vaccinated persons living in an endemic environment, so as to obtain a comparison of the results obtained by different methods. It considered, nevertheless, " that the use of vaccination can on no account warrant any relaxation in the continued application of all the other measures intended for the control of yellow fever : destruction of mosquitoes, piped water systems, etc."

The Aerial Navigation Commission reported on (*a*) the necessity or otherwise of Bills of Health under Article 9 of the Aerial Convention, which provides for certain entries in the journey log book although it does not require the aircraft to carry bills of health ; (*b*) the sanitary dues imposed by some countries for medical inspection, disinfection of planes, isolation of passengers etc. ; and (*c*) destruction of mosquit oes in aircraft. The delegate for India presented a statement on the imminent danger to India from the so-called " silent " regions as centres of transmission of yellow fever.

The Commission decided that so far as bills of health were concerned a leaflet should be prepared referring briefly to the terms of Article 9 and to the fact that no bill of health is required and that this could be attached to a 'plane's log book.

As regards the destruction of mosquitoes in aircraft, no definite recommendation was made as the question was under investigation in the United States.

In regard to the statement on the potential dangers of the " silent " areas the Commission repeated " that in its view the evidence of a previous invasion of the virus of yellow fever in a region, as revealed by the mouse protection test should not be considered as implying, *a priori*, and on that ground alone, that from a scientific or administrative point of view, the region concerned was at the moment infected with yellow fever. Additional evidence, such as the positive result of liver sections, confirmed by clinical signs, or the recovery of the virus, are necessary before a " silent " area can be regarded as actually infected ".

The discussions in the Smallpox and Vaccination Commission were confined to the immunity conferred by vaccination. The delegate for India presented a paper on " Studies on Anti-Smallpox Vaccination" by the Director of Public Health, Madras.

The Commission dealing with international arrangements for the treatment of venereal diseases under the Brussell's Agreement considered the question of adoption of the new medical card for seamen by countries which had not signed the Convention and Col. Harrison's note regarding standard courses of treatment.

The Opium Commission had under consideration the problems connected with Indian hemp ; sterilised ampoules of morphine-atropine and eucodal-atropine ; and delacaine, paracodine and preparine.

The delegate for India presented four other communications. These were :—

(*i*) " A biological method for the standardisation of plague vaccines and the relative protective power of some plague vaccines measured by this method " by Lt.-Col. Sokhey and Dr. Maurice.

(*ii*) " A chemical basis for vibrio classification and variation " by Dr. R. W. Linton.

(*iii*) " Note on milk supply by the Animal Husbandry Expert of the Imperial Council of Agricultural Research, India ".

(*iv*) " The life line of the Thyroid Gland, a contribution to the study of Goitre " by Col. McCarrison.

(B) At the October meeting of the " Office " Lt.-Colonel A. J. H. Russell, I.M.S. attended as delegate for India. The Quarantine Commission discussed a question relating to the fumigation of vessels and decided that in derogation of the provisions of Article 25 (6) of the I.S.C., 1926, following a first fumigation made before unloading, a second fumigation may be permitted in certain cases but without expense to the shipowners. It also considered a number of points relating to the application of the I.S.C., 1926 and recorded the opinion:—

" (1) That under the terms of article 10 of the Convention, the unexpected arrival of cases of cholera in a port shall not *a priori* justify the application of measures to ships coming from that port;

(2) That a " healthy " ship, coming from a port declared to be infected with plague (Article 27) should not, on account of that fact alone, be subjected to deratisation; deratisation may be imposed " in exceptional cases and for well-founded reasons ", and the sanitary authority, which is naturally the judge of these reasons, must always satisfy itself of the necessity of the measure, by an inspection of the ship or, if necessary, by other convincing proofs;

(3) That, in any case, a ship which has once been deratised in one port of a country should only be subjected a second time to deratisation in another port of the same country, if the conditions are particularly serious;

(4) That although the actual terms of article 28 do not make it definitely obligatory the granting of an extension of one month in the case of ships proceeding to their " home ports ", should be the rule and should only be refused if there are special conditions against it, involving danger to the port in which the ship is lying; in the absence of such conditions, the fact that the ship is not proceeding directly to its home port, it being understood that the return to that port does not take longer than one month,—should not in itself, according to the spirit of the Convention, be a sufficient reason for refusing the extension;

(5) That in principle a ship which is neither " infected ", nor " suspected ", nor " free" from plague, that is, a ship which has had no communication with an infected area, *should not*, according to article 28, *be deratised more often than every six months* (not including the supplementry period for return to the " home port "), from the date on which it has obtained a certificate of deratisation or of exemption (still valid) issued by a " qualified " port."

Other matters considered by the Commission included (*i*) adhesions to the Agreement regarding the abolition of bills of health or consular visas; and (*ii*) omissions to notify in time under Article 16 of the I.S.C., 1926, of the application of measures against arrivals from another country. In regard to the last point the Commission suggested that, when it is a question of specially important measures of such a nature as to require certain precautions to be taken by ships and passengers before departure, in particular, the requirement of certificates of vaccination, the Office International should, according to the spirit of Article 16, be informed by telegram of the decision taken by a Government with regard to arrivals from another country.

The Yellow Fever Commission considered notes relating to (*i*) recent scientific research on the disease, (*ii*) epidemiology of the disease based on a

recent epidemic of yellow fever in Bathurst in British Gambia, (*iii*) vaccination against yellow fever, (*iv*) the views of the Government of India on the risks of infection being carried to India through aircraft from certain parts of Africa, (*v*) knowledge of the existence of the disease by means of the mouse protection tests. In regard to the fourth point, the Commission made the following observations :—

" (1) Investigations on the existence of yellow fever by means of the mouse protection tests, accompanied or followed by clinical investigation and histo-pathological examination should be pursued uninterruptedly in all suspected regions in Africa in order to discover as soon as possible those in which the disease actually exists.

(2) The Commission desires to draw attention to the measures which are being or will be taken at Juba, Malakal, Khartoum and Cairo in regard to aerial traffic. These measures include the isolation, before embarkation, of persons suspected of having been exposed to yellow fever and the systematic disinsectisation of aircraft. When necessary, the aircraft and crew will be changed ; they will not proceed to areas where there is a risk of a new introduction of infection. The Commission are of opinion that such measures are sufficient to overcome the risk of transporting persons or infected mosquitoes beyond the locality where the measures have been taken. It is understood that if the aeroplane departs from an area where yellow fever exists, the aerodrome of departure will be of the anti-amaryl type (Art. 38 of the International Sanitary Convention for Aerial Navigation).

(3) The Commission also draws attention to the measures described in Section III of the International Sanitary Convention for Aerial Navigation which permit countries of arrival to repeat the procedure of inspection and disinsectisation of aircraft as well as the examination and, if necessary, the isolation of passengers. In the opinion of the Commission the measures mentioned in this and in the previous paragraph should provide sufficient safeguards to any country against the danger of the importation of the virus of yellow fever.

(4) The Commission were informed that the Government of India were considering the transformation of the Karachi aerodrome into an anti-amaryl aerodrome. A hope was expressed that the measures required for this purpose would be carried out with the least possible delay.

The Quarantine Commission for Aerial Navigation :—In connection with the enforcement of the Convention, it was agreed to circularise different participating countries in order to recall the terms of the Articles of the Aerial Convention which provide for the notification, through the Office International d'Hygiene Publique, of " sanitary " aerodromes, (a " local area " and " anti-amaryl " aerodromes) together with other information of importance for airway communications ; and the necessity for entering particulars in the *carnet de route* in accordance with the terms of Article 9. The delegate for India gave an account of the arrangements envisaged for organising the aerodrome at Karachi and for applying the necessary measures to aircraft. The Commission was also informed that in British India pending the adoption of special regulations, the measures prescribed by the Convention of 1933 were in the meantime in force.

The question of the extension of the Alexandria Bureau as a local bureau for the collection and dissemination of information of infected or suspected regions on the air routes converging on Cairo was talked out ; opinion was however in favour of deferring consideration of the matter till the next meeting of the " Office " and, in the meantime, of collecting information as to the conversion of aerodromes into anti-amaryl aerodromes and as to the possibility of countries sending their information by telegram to Paris for redistribution.

Other matters which engaged the attention of the Aerial Navigation Commission were the de-insectisation of aeroplanes ; anti-plague inoculation ; and regulations introduced by the Algerian Government for the control of aeroplanes coming north from the ' silent ' yellow fever areas. Regarding anti-plague inoculation, the Commission reaffirmed its view that " there is no information to show that anti-plague inoculation is a preventive against a country and that it should not be practised as a quarantine measure."

The Hedjaz Pilgrimage Report invited special attention to the danger, and the necessity for control, of the land routes to Mecca ; the danger arising from the embarkation at Aden of uninoculated and unvaccinated pilgrims ; the undesirable practice of pilgrims embarking at ports between Kamaran and Jeddah on ships which have already passed through Kamaran on their way to

Jeddah ; the reopening of the Medina Railway ; the inadequacy of arrangements for the hospitalisation of sick pilgrims in Saudi Arabia ; the practice of examining stools of pilgrims passing through El Tor ; and lastly the case of a ship returning to Bombay with a large number of cases of disease on board, who had been embarked at Jeddah without any previous medical inspection by the ship's doctor.

The delegate for India presented the following contributions :—

(*i*) " Duration and degree of immunity against smallpox conferred by vaccination in infancy " ; by Dr. Pinto.

(*ii*) " Researches on cholera in India " ; by Col. Russell.

(*iii*) " Serological relationships of certain vibrios isolated from non-cholera cases " ; by Col. Taylor.

(*iv*) " Anti-cholera inoculation " ; by Dr. Govinda Raju.

(*v*) " The probable trend of population growth in India " ; by Dr. Raja.

Singapore Bureau, League of Nations.

53. The Bureau was directed by Dr. C. L. Park throughout the year.

No meeting of the Advisory Council was held during the year, but the Director's report, accounts and the budget for the year and the budget for the following year were circulated to members for approval. Expenditure for the malariology course which previously was provided in the Health Section budget was included in the budget of the Bureau.

The second Committee to the Assembly in its report on the work of the Health Organisation referred to the importance of the epidemiological intelligence service and the international courses in malariology held at Singapore.

In accordance with the agreement between the Health Committee of the League of Nations and the " Office International," the Bureau continued to receive and distribute epidemiological information as required under the I.S.C., 1926. The weekly Fasciculus issued by the Bureau included epidemiological data from 35 countries in addition to a list of ports qualified to carry out deratisation of ships and to issue deratisation or deratisation exemption certificates.

Infected ships.—Twenty ships were notified as infected with cholera, infection in each case having been contracted in an Indian port. Calcutta alone was probably responsible for 15 and Burmese ports for 4. In regard to smallpox, 16 cases were traced to Chinese ports and 17 to Indian. No cases of plague infection were notified ; chickenpox was responsible for 65 cases and c.s. meningitis for one.

Pilgrim traffic.—The Hedjaz pilgrimage was declared clean by the Sanitary, Maritime and Quarantine Board of Egypt. In addition to 20 healthy carriers of agglutinating vibrios isolated in the Lazaret hospital at El Tor, 4 other sick persons were found to be carrying similar organisms.

Disease incidence in ports.—Four of the nine plague infected ports were in British India, *viz.*, Bassein (34 cases), Rangoon (15), Moulmein (2) and Bombay (1). Calcutta with 4,947 cases was as usual the most heavily cholera-infected port in the East ; Madras had 338 cases and Bangkok 175 ; in other ports the incidence was sporadic or low. As regards small-pox Bombay had 1,919 cases, Calcutta 1,698 and Vizagapatam 667.

Research programme.—The report refers to work on plague, cholera and smallpox.

Plague.—(*i*) Inoculation of the population in plague infected areas with a living avirulent vaccine prepared by Otten from a strain isolated from a plague rat; (*ii*) the Haffkine Institute studies on the potency of plague vaccine; and (*iii*) study of the epidemiology of plague in the Hawaiian Islands in its relationship to the rat-flea species and to temperature and humidity.

Cholera.—(*i*) The serological examination of vibrio strains insolated from different sources in endemic and non-endemic areas in India by Taylor and Ahuja; (*ii*) Linton's work in India on the isolation and analysis of 3 types of specific carbohydrate substances in vibrios; and (*iii*) cholera researches and field experiments with bacteriophage in Assam.

Smallpox:—The work of Japanese scientists in producing a therapeutically effective serum. An active antiviral serum has been secured by the repeated subcutaneous inoculation into the goat of the purified vaccinia virus, the inoculations being made with successively increasing amounts of vaccinia virus over a period of 3-7 months at an interval of five days. It was reported that, provided a certain sufficient amount of the purified vaccinia virus was inoculated into rabbits weighing approximately 1,000 grms., generalised vaccinia occurred on the fourth or fifth day, but in the case of animals weighing about 2,000 grms., the occurrence of the vaccinia was postponed until the seventh day.

If these animals were later treated with anti-vaccinia sera, either intravenously or intramuscularly, it was found that the appearance of eruptions was completely or strongly inhibited.

Liaison work.—This was continued by the distribution of literature.

Malaria Course.—The second course was held during April, May and June and was attended by 14 doctors from 8 countries.

League of Nations Health Organisation, Geneva.

54. The Assembly of the League recorded its appreciation of the work of the Health Organisation in the following terms:—

" The Assembly,

Notes with satisfaction that the national administrations of countries in all continents are making ever-increasing use of the services of the Health Organisation and are affording it a growing measure of support in discharge of its duties;

Approves the work of the Health Organisation and the Rapporteurs' conclusions, and refers to the Health Committee for study the offers of collaboration and the suggestions enunciated in his report ".

The League continued to maintain the Service of Epidemiological Intelligence and Public Health Statistics; the Biological Standardisation Commission established in 1921; the system of liaison between Public Health Administrations started in 1922; and the Malaria Commission set up in 1924. In public health and social medicine the Health Committee continued to conduct its work of investigation, collection of data and liaison and to publish results through its Quarterly Bulletin.

From studies on the biological assay of certain therapeutic agents, international standards have been obtained. An Inter-governmental Conference on Biological Standardisation was convened at Geneva in October with a view to ensure the use and, if possible, the adoption in the official pharmacopœias, of the Health Organisation's standards and units in the case of 21 therapeutic substances.

In the field of epidemiological intelligence, various administrations were supplied as usual with early information concerning the health situation in neighbouring countries. The reports received by the League covered 148 countries and territories with 72 % of the world population.

The Malaria Commission during its existence of 10 years has accumulated a wealth of specialised knowledge of the treatment and prevention of malaria by synthetic remedies. International courses of malariology were organised. The Commission met in February in order to take a final decision on the details of the experiments and to acquaint themselves with the investigations on the same problems which were in progress in the U. S. S. R.

A Pan-African Health Conference was called at Johannesburgh in November to continue the work of the Conference held at Cape Town in 1932. Further details of this Conference will be found in para. 56 on page 100.

After a request by the United Kingdom Government and preliminary investigation by the Communications and Transit Commission, the Council of the League authorised the Health Organisation to make necessary preparatory studies on the question of an international Convention dealing with pollution of the sea by oil. It was considered that such a Convention would considerably reduce the damage now caused to property in ports, to bathing resorts, to bird life and to fisheries.

The European Conference on Rural Hygiene held in 1931 had requested Institutes and Schools of Health to investigate *inter alia*, food stuffs, especially milk; typhoid fever in country districts; the supply and purification of drinking water; and the " treatment " of manure and household refuse with a view to destruction of flies. These investigations were carried out under the general direction of the Health Organisation and a large amount of data collected. The Directors of Schools and Institutes of Public Health from certain countries met at Geneva in April. These studies having been found of great interest and of practical utility, the Health Committee was asked to continue them. The question of rural housing and farms was also considered and the decision was that there should be (*a*) a general review of the housing conditions in farming districts, from the point of view of hygiene and public health and from the economic and social standpoint; and (*b*) a consideration of the types of rural dwellings best suited to various geographical areas and to the customs and nature of work of the inhabitants.

The Health Committee completed an enquiry into the treatment of syphilis involving a survey of over 25,000 cases in selected clinics of five countries. The enquiry has led to the establishment of certain general principles which should govern the treatment of this disease. Two plans of treatment have been formulated which should give satisfactory results in ordinary cases of early syphilis.

Nutrition has been on the League's programme since 1925. After a period of preliminary study, the League published a report which, after reviewing recent progress of science and applied physiology in this field, described what the public authorities in a number of countries have already done or propose to do. The Assembly of the League considered that the Health Organisation should continue to develop its investigations into nutrition and nutrition problems in relation to public health, and that the other technical organs of the League should continue their enquiries into the economic and financial aspects of the problem in connection with those measures already adopted in various countries for improving nutrition and mitigating the plight of agriculture. Because of the inter-dependence of the various aspects of the problem,

the Assembly considered it desirable to arrange for a wide survey and asked the Council of the League to prepare a general report for the next Assembly.

The resolution of the Assembly runs as follows :—

" The Assembly,

Having considered the subject of nutrition in relation to public health and of the effects of improved nutrition on the consumption of agricultural products urges Governments to examine the practical means of securing better nutrition and requests the Council:

(1) To invite the Health Organisation of the League of Nations to continue and extend its work on nutrition in relation to public health ;

(2) To instruct the technical organisation of the League of Nations, in consultation with the International Labour Office and the International Institute of Agriculture, to collect, summarise and publish information on the measures taken in all countries for securing improved nutrition, and

(3) To appoint a Committee, including agricultural, economic and health experts, instructed to submit a general report on the whole question, in its health and economic aspects, to the next Assembly, after taking into consideration *inter alia*, the progress of the work carried out in accordance with paragraphs (1) and (2) above."

The Health Organisation representative attached to the Central Health Administration of China cooperated in the establishment and operation of model central institutions and in the improvement of health conditions in several provinces of the interior. In America the Health Organisation co-operated in an investigation into the problems of general nutrition in Chile and collaborated with the international centre for research on leprosy at Rio de Janeiro.

A collective study tour was organised in the U. S. A. in November, 1935.

The twenty second session of the Health Committee was held from 7th—14th October, 1935, and was attended by Lt.-Col. A. J. H. Russell, C.B.E., K.H.S., I.M.S. Colonel Russell was appointed a member of the Opium and Leprosy Commissions and also of that appointed to examine the report and budget of the Singapore Bureau.

The more important subjects of discussion were (*i*) the composition of the Health Committee and of the Health Bureau ; (*ii*) the preparation of an International Pharmacopœia ; (*iii*) Dr. Aykroyd's and Dr. Burnet's report on Nutrition and Public Health ; (*iv*) the invitation of the Dutch East Government to hold the Rural Hygiene Conference in Java and the possibility of holding a rural hygiene International Exhibition in Rome in 1937 and (*v*) the report of the Biological Standardisation Conference. The proposal to enlarge the Bureau was adopted.

Dr. Burnet's and Dr. Akyroyd's report on Nutrition and Public Health discussed three questions, (*i*) what are men's requirements ? (*ii*) what are the resources available to meet them ? and (*iii*) How can an adequate dietary be brought within the reach of those who need it? Col. Russell made references to the intimate connection between the incidence of deficiency and malnutritional diseases and epidemics, the interest that India was taking in the problem, and made particular mention of the appointment of Dr. W. R. Aykroyd as Director, Nutritional Research in India. He assured the Committee that India would collaborate with its work in this field in every possible way.

Inter-governmental Conference on Biological Standardisation, held at Geneva from October 1st to 4th, 1935.

55. Lt. Col. A. J. H. Russell, C.B.E., K.H.S., I.M.S., represented the Government of India.

The Permanent Commission on Biological Standardisation of the League had worked out international standards for a series of products, the assay of which could only be effected by biological methods. The main purpose of the conference was to induce health administrations, pharmacopœia commissions, research laboratories and manufacturers, who deal with biological assays, to express the results of titrations in terms of the international standards and units established by the Permanent Commission on Biological Standardisation. As the method so far followed in distributing these standards needed some modification, in order to afford relief to the National Institute at Hampstead and the State Serum Institute at Copenhagen which undertook this work on behalf of the Health Organisation, it was decided that the most suitable solution would be to set up in each country a national centre or centres to take charge of the distribution to laboratories and manufacturers concerned.

Two technical committees were set up to consider the two groups of international standards. Their recommendations which were accepted by the Conference, were :—

"I. The Conference expresses the hope that the use of the international standards adopted by the Permanent Commission on Biological Standardisation of the Health Organisation will be made effective by the competent authorities of all countries.

II. The Conference recommends that each country should have a national centre or centres, recognised by the competent authority, to take charge of the international standards and equivalent national standards; and that every such centre should have a qualified staff to control the application of the international standards in its own country and thus to serve as the recognised national scientific authority in this field.

III. The Conference, looking confidently to the Health Committee to maintain the principles of the free distribution of international standards, recommends that the League of Nations should place the necessary funds at the disposal of the Health Organisation for it to continue to meet the expense entailed by the free distribution of such standards.

IV. The Conference, having been informed that patents protecting the preparation of streptococcus anti-toxin (anti-scarlatina serum) and of the toxin used for its assay have been granted in certain countries; believing that this practice constitutes an obstacle to progress in the standardisation of this serum; draws the attention of the Health Committee of the League of Nations to this state of affairs, and suggests that the Committee might usefully consider what means could be employed to avoid the serious drawbacks which ensue.

V. The Conference recommends that, in view of the progress achieved in the field of biological standardisation, inter-governmental conferences on this subject be summoned periodically at intervals not exceeding three years."

Colonel Russell in his report on this Conference suggested to the Government of India that centres for the control of standards should be opened at (*a*) the Nutritional Laboratories in Coonoor for Vitamin standards; (*b*) the Central Research Institute, Kasauli, for sera, etc., and (*c*) the School of Tropical Medicine for hormones and drug standards.

The Pan-African Health Conference held at Johannesburg, Union of South Africa, 20th—30th November, 1935.

56. The Government of India was represented by Major General Sir Cuthbert Sprawson, Kt., I.M.S., Director-General, Indian Medical Service. Though sent as an observer only, General Sprawson participated actively in the discussions on yellow fever which was the subject of chief importance to India. He also gave Indian experience on plague, malaria and anti-locust campaigns.

General Sprawson's statement in regard to yellow fever is reproduced below :—

" The Government of India is seriously apprehensive of the danger of entry by aeroplane, through the airport of Karachi, of man and mosquito infected with yellow fever from Africa. India's apprehension is chiefly with regard to her own large population, who are non-immune to yellow fever and who have the *Aedes Aegypti* around them; but, also, since from the view of aerial traffic India is the gateway to the far East, the countries beyond India are also interested in the protection of India.

If India is the gateway to the Far East, the portcullis of that gate is Karachi, and India is doing her best to make there an efficient barrier. An officer is now being appointed for the sole duties of port health officer of the airport of Karachi, as distinct from the seaport, which is 10 miles distant. India is also proceeding to make the Karachi aerodrome anti-amaryl. But reliance on this one barrier on the Indian side alone is not enough ; it is necessary also that the utmost possible be done on the African side of the gate to prevent infective material approaching it. The International Sanitary Convention for Aerial Navigation of 1933 differentiates in Chapter II between these areas where yellow fever exists endemically (Section II) and those where it does not exist, but where conditions permit of its development (Section III). At present, the areas in Africa hitherto called " silent areas ", being classed only under Section III, the Government of India has good ground for a feeling of insecurity. This feeling will remain until it is recognised that those areas giving a fair percentage of positive protection tests and viscerotome tests should be regarded as endemic areas of yellow fever and be treated accordingly. After hearing Dr. Soper's paper on yellow fever in Brazil, we cannot doubt the importance of these tests and that the areas showing them are endemic.

We are, however, still in some doubt as to the extent of such areas in parts of Africa. It has been shown that extensive epidemics of yellow fever occur in French Equatorial Africa. There is a high percentage of positive seral reactions in towns of the interior, and facts point to the danger of the infection spreading eastward. A case of yellow fever has occurred at Wau, in the Anglo-Egyptian Sudan, and the infection was said to be endemic in Bahr-al-Ghazal six years ago, in Juba seven years ago, and in other places in the Anglo-Egyptian Sudan at varying intervals.

The report of the October 1935 meeting of the Yellow Fever Commission, of the Office International d'Hygiene Publique, is encouraging in that it advocates further viscerotome and mouse protection examination and gives particulars of protective measures that are being taken at various places. I have, however, reason to think that not everything in this respect is being done that has been claimed by some.

Considering the importance of this matter to India, I suggest to the Conference the following three procedures :—(1) A thorough examination by mouse-protection and viscerotome tests of the neighbourhood of all aeroplane stopping places in the Anglo-Egyptian Sudan, in Kenya and in Uganda ; (2) further examination by the above tests of other areas in Africa in order to determine the limits of the endemicity of yellow fever ; and (3) that all crews of planes crossing from Africa to India be immunised by means of Sawyer's mixed neurotropic yellow fever vaccine.

When, as a result of proposal (1) we know more of the position in the three administrations named, we may then be able to make more specific recommendations as to the necessity for further protection."

The resolutions adopted by the Conference on the question of Yellow fever are quoted in extenso :—

" The Conference recommends :

1. That investigations as to the existence of yellow fever by means of the mouse-protection test, accompanied or followed by clinical investigation and histopathological examination (including the routine use of the viscerotome), be carried out in all endemic regions in Africa, and particularly along the periphery of such regions, in order to ascertain as soon as possible those in which the disease actually exists.

2. That an intensive study of the possibility of the existence of jungle yellow fever in Africa should be made in view of the presence of this condition in South America.

3. That consideration be given to the training of laboratory workers in yellow fever research and routine investigations and that provision be made for permanent laboratory facilities in centres accessible to endemic areas.

4. That further investigations be made regarding the distribution of *Aedes aegypti*, both in endemic and in other African territories to which the disease may spread.

5. That consideration be given to the organisation of measures for the control of *Aedes aegypti* in all territories included within and bordering upon endemic areas.

6. That a system be established of quarterly reports to the Office International d'Hygiene Publique of house larval indices relating to *Aedes aegypti* from important centres in endemic areas.

7. That every first case of yellow fever and the locality in which it has occurred be notified direct, by telegram as soon as official information is available, to the Office International d'Hygiene Publique by African Colonial Administrations.

8. That the decision to suspend traffic in an aerodrome which, situated in a region in which yellow fever has appeared, is not organised in accordance with the provisions of Article 38 of the International Sanitary Convention for Aerial Navigation of 1933, and the decision to reopen the aerodrome to traffic be similarly notified direct to the Office International d'Hygiene Publique."

Indian delegation to the 16th Ordinary Session of the Assembly of the League of Nations held from the 9th—28th September, 1935.

57. The Indian Delegation consisted of His Highness the Right Honourable the Agha Khan, G.C.S.I., G.C.I.E., G.C.V.O., leader of the Delegation; Sir Denys Bray, K.C.S.I., K.C.I.E., C.B.E., (Member of the Council of India); and Rai Bahadur Seray Mal (now Sir S. M.) Bapna, C.I.E., (Prime Minister of Indore). Mr. Bijay Kumar Basu, C.I.E., member of the Council of State, acted as substitute delegate.

The delegation reported on the second committee as follows :—

"The review of the work of the League Health Organisation during the preceding year, which was submitted by the Rapporteur, revealed no question of outstanding importance for discussion. Nearly every speaker, however, paid a tribute to the methods and achievements of the Organisation, to the worldwide character of its activities, and to the value of its collaboration with national health administrations. Particular interest was shown in a number of international conferences which were to be held in co-operation with the Organisation or under its auspices. Among these were the Conference on Biological Standardisation, to be held at Geneva in October 1935, at which India was to be represented; and the Second Pan-African Health Conference, which was to meet at Johannesburg in November 1935, and to which India was to send an observer, in view of the necessity of concerting measures for preventing the spread of infectious diseases between India and Africa. India is even more interested in the Conference on Rural Hygiene in the Far East, which is to be held towards the end of 1936*; indeed at each Assembly since 1932 the Indian Delegation has urged the convocation of such a Conference. The arrangements for the Conference are being undertaken by the Eastern Bureau of the League Health Organisation at Singapore, and its agenda was informally discussed at the ninth Congress of the Far Eastern Association of Tropical Medicine, held at Nanking in October 1934. It was there agreed that the principal questions for the Conference would be the type of medical and health organisation best adapted to the special conditions of rural districts in the East, the staff and its training, the campaign against the principal endemic and epidemic diseases, and the improvement of health and social conditions in rural districts.

The Government of India's appreciation of the work of the Health Organisation contact with which had accelerated progress in India, was expresed by Mr. Bapna, who said that his Government was devoting special attention to the question of rural hygiene and to the health and housing of the rural population; a problem so vast that the end in view could not be achieved for many years to come. They therefore welcomed the prospect of the Conference on Rural Hygiene in the Far East.

India attached the greatest value to the services being rendered by the Eastern Bureau at Singapore, in which it co-operated by supplying weekly by cables the epidemiological information relating to disease in Indian ports and British provinces, particulars of plague-infected rats in Indian ports, and of infected ships arriving at Indian ports and engaged in international traffic. The Bureau's weekly epidemiological messages, broadcast from Java, were re-broadcast in clear from Karachi and Madras every Saturday for the benefit of ships at sea.

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* Since decided to be held in August 1937."

From India's point of view, the most important matters dealt with by the Regional Health Conference held in Cape Town in 1932 were the technical discussions on the prevention of the transmission of yellow fever by aircraft and on the spread of smallpox from India.

The existing provisions regarding yellow fever had been made as a result of the International Sanitary Convention for the Control of Aerial Navigation. The Central and East African countries had arranged for concerted action regarding the use of protection tests, and in making surveys of vector species in their ports and towns. Technical reasons had so far prevented the Government of India from reaching a final decision as to adherence to the Convention, but the discussions at Johannesburg would assist it in framing its future policy regarding yellow fever in general and the Aerial Sanitary Convention in particular.

With regard to smallpox, difficulties had arisen in recent years over the measures taken by the South African and East African Governments to prevent its introduction from India. Fresh problems arose with regard to the acceptance of vaccination certificates issued in India without verification by some responsible authority. The governments concerned had been discussing the matter and the Government of India had now amended its procedure in a manner acceptable to several of the East African Governments.

Thanks to a special fund called King George's Thanksgiving (Anti-tuberculosis) Fund, India had been enabled to carry on some useful work in connection with tuberculosis by the allocation of annual grants to local associations undertaking work in this field."

Nutrition and Public Health.—" The attention of the Assembly was drawn to the problem of nutrition in its relation to public health at the request of twelve delegations. It was pointed out that nutrition, a public health problem, has also become a social and economic problem and one closely connected with the formidable difficulties experienced by the farming industry all over the world in disposing of its surplus foodstuffs. The discussion in the Second Committee, in which twenty delegations took part, was opened by the Australian delegate, Mr. Bruce, who said that the study of the question might well pave the way to better health conditions in all countries and to a solution of the agricultural problems at present facing the world. He stated the essence of the problem in his description of the paradox of a glutted market for the farmer and the insufficient nourishment of a substantial proportion of mankind in "protective foodstuffs" such as milk, fresh vegetables, fruit, eggs and meat. He realised that the nutrition problem varied enormously in extent from country to country and said that in certain of the less developed overseas countries, with their teeming millions of population, improvement must be regarded as a long-range objective. In an intermediate class of countries, mainly agricultural, there was no scarcity of food, but the food available was not necessarily the most suitable from the nutrition standpoint. These might be regarded as a medium-range objective. On the other hand he thought that improvement in the richest and most developed countries could be viewed as an immediate goal, and to show the need for improvement in such countries he quoted the United States representative at the last International Labour Conference as saying that even in the prosperous year 1929, six million children in his country had suffered from malnutrition. He moved a resolution, the main lines of which met with general agreement and which, with slight modification, was ultimately adopted by the Committee and approved by the Assembly. The resolution suggested, first that the work of the League Health Organisation on nutrition in relation to public health should be continued and extended; secondly, that the League, in consultation with the International Labour Office and the International Institute of Agriculture, should collect information on the measures taken in all countries for securing improved nutrition; and, thirdly, that a Committee including agricultural, economic and health experts should be appointed to submit a report on the whole question in its health and economic aspects to the next Assembly."

The following extracts from the Report of the Fifth Committee which dealt with the questions of child welfare, opium and the International Relief Union are also of interest :—

" The questions relating to Child Welfare discussed this year fall into two categories. On the one hand, there were problems connected with abnormal children—young offenders, blind children and children abandoned by their parents. On the other hand, there were those aspects of the Committee's work, whose importance was emphasised by the Rapporteur, which concern the normal child. In this connection interesting exchanges of views took place on the effect of the economic depression and unemployment upon

the young and on the recreational aspect of the cinema in the life of the child. In addition, the Committee's attention was drawn to the work already achieved by the Information Centre since its foundation in June.

The speech of the delegate of India was at once a warning against extending the activity of the League in this sphere beyond these exchanges of views and this collection of information, and evidence that the policy of the Government of India is in agreement with the view, expressed in the resolution adopted by the Committee, that the treatment of delinquent children should be directed towards education rather than punishment. Mr. Bapna said that he had read with genuine pleasure the reports of the work of the Child Welfare Committee and of the Advisory Commission and the report submitted by the Rapporteur. They contained valuable suggestions and ideas to which no country could take exception. No doubt some questions were controversial, not in principle, but owing to varying conditions in different countries. An attempt at standardisation in this field by international agreements or conventions was neither desirable nor likely to succeed. Modifications and adaptations would be necessary according to the social, economic and religious conditions prevailing in a country. Child Welfare work was primarily the domestic concern of the States, and the League's activity should be confined to collecting and disseminating facts which should serve as a guide to social reformers and Governments. Any direct action taken by the League was likely to frustrate the very object for which action was intended. This was the view taken by the delegation of India in 1925 and in 1926 also.

As regards the progress of the work in his own country, great improvements had taken place during the last fifteen years. The ages of marriage had been raised and in most of the Provinces laws had been passed for the protection of children and, in the case of offenders, for their segregation from ordinary criminals. The Madras Juvenile Offenders Act, 1920, was typical of such legislation. As an alternative to ordinary punishment it provided for discharge under the care of a parent or guardian. Provision was also made for committal to an industrial school. Under the Act the Government was empowered to establish juvenile courts, or where this had not been done, young offenders were tried in a different room or at a different time. Several schools were maintained or certified by the Government for delinquent children. In some provinces, the Act provided for committal to an industrial school of children found begging or destitute, and for the punishment of cruelty to children. A special police staff had been appointed for the administration of the Bengal Act and a Children's Aid Society had been formed. With the co-operation of these bodies a large number of children had been removed from brothels and given shelter. For Borstal schools an adolescent offender was defined as between the ages of fifteen or sixteen and twenty-one years. The period of detention varied from two to five years. For delinquents below fifteen there were reformatory schools in which the period of detention varied between three and seven years. In some provinces there were Acts in which provision had been made for the boarding out of children and for rescuing them from immoral surroundings, also for improving their health and providing recreation. Similar provisions had also been made in some of the Indian States. This in brief was the record of work in India and he had no doubt that in future the progress would be maintained.

Opium and other dangerous drugs.—Although nearly every speaker paid a warm tribute to the work of the Advisory Committee and the other organs of the League which deal with the drug problem, it was frankly stated that, in spite of all that has been achieved in the way of international control, there has been no decrease in the illicit traffic. While the measures taken under the auspices of the League have put a stop to leakages on a considerable scale from the authorised manufacturer, the traffic now draws its supplies from clandestine factories. The Fifth Committee was unanimous in encouraging the League organs to persevere in their efforts to remedy this very serious situation. At its next session the Advisory Committee will discuss both clandestine manufacture and drug addiction, as well as measures to combat them. The Secretariat is already engaged in collecting such information as is available on these subjects. Moreover a Committee of Experts on which India would be represented, was to meet in December in order to consider the draft convention, which was in the hands of Governments, relating to the suppression of the illicit traffic. Lastly, the Fifth Committee asked the Governments of the producing countries to supply the Secretariat as soon as possible with the information it needs for its enquiries into the possibility of limitation of raw materials; this matter may be considered later at a special conference.

A separate problem is that of hemp drugs, which is being studied by the Advisory Committee. The situation was summed up by the Greek delegate, who said that examination of the question had made considerable progress from the medical and chemical standpoints, but much remained to be done in the direction of more efficient regulation of the hemp trade by means of international engagements.

A number of delegates gave interesting information concerning measures taken in their countries or overseas possessions to combat the drug habit by means of education. It was pointed out that useful work could be done not only by negative methods such as instruction in the dangers of drug addiction, but also by the positive method of providing other interests and occupations, such as the encouragement of games among the young.

During the discussion, Mr. Bapna said that, even prior to the Hague Convention, the Government of India had discharged their obligations under agreements which they had accepted, and since the establishment of the League they had whole-heartedly co-operated with its policy in the matter. He was glad to say that the obstacle which had hitherto prevented the ratification of the Bangkok Agreement by India had now been removed by the passing of the Dangerous Drugs Act in Burma.

The Chairman congratu'ated Mr. Bapna on this information, which is also mentioned in the Committee's report to the Assembly. In the course of his speech the Chinese delegate expressed his appreciation of the way in which the Government of India were carrying out the agreement between India and China ; while the delegate of Iran pointed to this agreement as a model for the agreements which his Government hopes to conclude with the consuming countries of the East."

International Relief Union.—"In accordance with a decision by the Assembly, the Report of the International Relief Union for the period July 1933 to December 1934, was added to the agenda of the Fifth Committee. A resolution proposed by the Venezuelan delegation and adopted by the Committee noted that thirty states had acceded to the Union, congratulated it upon what it had already achieved, and stressed the importance of its work of co-ordinating the efforts of other relief organisations.

India has especial reason to be grateful for the work of the Union, since the first two manifestations of international generosity under its auspices have been for relief work in connection with earthquakes in India. In January 1934 the Union contributed £1,000 to the Indian Red Cross for the assistance of the victims of the Bihar earthquake. Again, when the Quetta earthquake occurred in June 1935, the Union rendered invaluable service by circulating to its member States an appeal which met with an extremely generous response from a number of Governments."

Port Quarantine.

58. All the major ports in India have well qualified Health Officers except Calcutta. Satisfactory arrangements have since been made with the Bengal Government for the appointment of a qualified officer. In most minor ports part-time arrangements exist with the civil surgeons, municipal M.O.Hs., medical officers and with customs officers.

The revised rules framed under Section 6 (1) (*p*) of the Indian Ports Act, 1908, and the question of the establishment of port sanitary authorities at the major ports in India were still under consideration of the Government of India.

The Government of India have not yet decided to ratify the I. S. C., 1926, but the epidemiological and other communications demanded under the Convention were as before supplied to the Singapore Bureau of the League and the Office International d'Hygiene Publique.

Although this report is intended to cover only the year 1935, it may be stated here that the Government of India have recently decided to reintroduce at the port of Karachi arrangements for the grant of deratisation and deratisation exemption certificates with effect from 1st April, 1937. It has also been decided that as an experimental measure, for two years in the first instance, all oceangoing ships as well as country craft, barges, etc., requiring fumigation in Bombay Harbour should be subjected to fumigation by the cyanide process.

The progressive acceleration of international communication, particularly by air, having increased the danger of an extension of yellow fever from West to East Africa and from thence to the Orient, the Government of India considered it important to obtain regular information as to the degree of infestation with stegomyia mosquito which exists at their major ports. Port authorities

and those in control of adjoining urban areas are now working out at regular intervals a stegomyia index for their own areas and various measures are being applied to ensure that this index is maintained at a low figure. The index is defined as the percentage of houses or quarters inspected in which stegomyia mosquitoes were found breeding.

The Government of India have prescribed standard forms for anti-cholera and vaccination certificates required by passengers embarking at Indian ports for foreign ports.

Table V (*i*) gives the more important mortality statistics of the major ports and Table V (*ii*) particulars of rat destruction within port areas.

TABLE V (*i*).

	Bombay.		Calcutta.		Madras.		Rangoon.		Karachi.	
	Deaths.	Ratio p.m.	Deaths.	Ratio p.m.	Deaths.	Ratio p.m.	Deaths.	Ratio p.m.	Deaths.	Ratio p.m.
Total	29,117	25·1	34,093	29·9	24,642	38·9	10,061	25·2	5,671	22·9
Small-pox	1,248	1·1	1,173	1·0	59	0·1	172	0·4	97	0·4
Cholera	13	...	2,116	1·8	141	0·2	69	0·2	...	...
Plague	1	...	...	...	...	...	17	...	...	...
Enteric fever	225	0·2	864	0·8	186	0·3	49	0·1	43	0·2
Malaria	96	0·1	607	0·5	167	0·3	80	0·3	25	0·1
Kala-azar	*1	...	149	0·1	...	...	3	...	...	...
C. s. fever	134	0·1	701	0·6	...	...	6	...	8	...
Influenza	71	0·1	457	0·4	...	...	6	...	7	...
Measles	264	0·2	146	0·1	7	...	1	...	41	0·2
Dysentery	346	0·3	1,311	1·1	1,314	2·1	161	0·4	88	0·4
Tuberculosis	1,913†	1·6	2,856†	2·5	1,209	1·9	879†	2·2	515†	2·1
Other causes	24,805	21·4	23,713	21·0	21,559	34·0	8,618	21·7	4,852	19·5

*Imported from Cawnpore. †Phthisis or pulmonary tuberculosis.

TABLE V (*ii*).

	Destroyed.	Examined.	Found infected with plague.
Total	48,526	12,669	140
Calcutta	5,562	637	..
Chittagong	136	136	..
Karachi (Wharf)	3,159	410	..
Bombay	7,458	7,458	..
Cochin	18,232	305	130
Rangoon	2,728	2,069	..
Bassein	4,355	957	10
Moulmein Town	6,896	697	..

In the ports of Calcutta, Bombay and Rangoon, considerable numbers of rats were destroyed on board ships but, of those examined, none were found infected with plague.

Deratisation of ships was carried out in Calcutta, Bombay and Rangoon by means of sulpher dioxide. At Calcutta, 51 vessels were deratised and 61 given exemption certificates; at Bombay 45 (loaded 1 and unloaded 44) and 17 (loaded 3 and unloaded 14); and at Rangoon 39 (loaded 25 and empty 14) and 34 (empty). No ships were deratised before discharge of cargo.

Port of Bombay.

59. Lt.-Col. C. L. Bilderbeck, I.M.S., continued as Port Health Officer.

Incoming vessels.—Medical inspections were made of 117 "infected" or "suspected" vessels carrying 13,487 members of crews and 23,893 passengers and pilgrims. Excluding intercoastal vessels, 22 were found to have or to have had cases of infectious disease on board at the time of arrival or during the voyage of which 24 were chickenpox, 12 measles, 5 mumps, 3 scarlet fever and 2 jigger. Six vessels, with cases of measles on board left the port within 12 days of arrival but their bills of health were endorsed indicating the disease which had occurred and the preventive measures taken. The international wireless code was used to full advantage.

Outgoing vessels.—Altogether 755 vessels carrying 54,928 members of crews and 48,621 passengers were inspected, whilst 26,143 Asiatic and African members of crews and 16,764 third class, fourth class and deck passengers and Asiatic and African servants were, prior to departure, subjected to medical examination; their clothing and bedding were also disinfected. Amongst these, 26,777 persons were vaccinated and 5,931 inoculated against cholera. Both pilgrims and all classes of African bound passengers were found fully protected against smallpox.

Available information shows that 43 cases of infectious disease were landed at overseas and other Indian ports from ships which sailed from Bombay. These included one case of smallpox at each of the ports of Colombo, Mombassa, Suez, Singapore, Jedda, Karachi and Rangoon; 16 cases of chickenpox; 2 scarlet fever; 2 cerebrospinal meningitis; 9 pneumonia; and 7 measles. A system of advanced medical inspection was introduced in the case of large passenger vessels in order to facilitate the embarkation of passengers desirous of boarding earlier than the scheduled times for inspection.

Red Sea Pilgrim Traffic.—As regards outward traffic, prior to the first voyage every pilgrim ship was thoroughly cleansed and deratised by the Clayton process; on subsequent voyages, each ship was exempted from further deratisation subject to freedom from rats. All pilgrims were medically inspected and bedding and clothing, where there might have been exposure to infection, were disinfected. A total of 5,931 pilgrims in 12 vessels sailed for Jeddah between 12th November, 1934 and 28th February, 1935.

In regard to inward traffic ten ships returned from Jeddah with 5,009 pilgrims; 3 arrived with one or more cases of chickenpox on board, and 24 deaths were recorded on the voyages, these being mostly due to old age and debility.

General—(i) Disinfection.—Twenty-eight vessels were disinfected on account of infectious disease. The clothing and bedding of 43,207 members of crews and passengers in out-going and incoming vessels or in vessels lying in the harbour were disinfected. The port disinfection station dealt with 7,111 bundles of clothing and bedding received from different hospitals.

Under article 28 of the I. S. C. 45 ships were deratised, the number of rats killed varying from 9 to 163; deratisation exemption certificates were issued to 17 vessels. Fifteen deaths from accidents occurred on board the vessels in the harbour or docks.

(ii) Rats and fleas.—During the year, 759,618 rats were destroyed in Bombay city, 7,458 in the docks and 1,056 on 50 vessels; 227,485 rats from the city, 7,458 from the docks, and 542 from broadships were examined, but none was found plague infected.

(*iii*) *Port Sanitation.*—The sanitary state of the harbour and of the *bunders* and docks generally was reported to be satisfactory.

(*iv*) *Other matters.*—The inspection of food supplies for lascar crews was continued; 38 of the 123 samples of *ghee*, two of lime-juice and two of flour taken for analysis were condemned.

A mosquito survey of 11,989 country craft in the harbour was carried out by the Port Trust staff; 4,080 were found to be breeding mosquitoes.

An investigation was carried out to ascertain whether the rat and rat flea populations on steamers visiting the harbour were of the same species as those in the docks area.

The rat species were found to be much the same, but the shore rats had large numbers of fleas. Whilst *X. Cheopis* was the predominating flea on ship rats, the majority on dock rats were *X. astia.*

Port of Karachi.

60. *Staff and Administration.*—Dr. B. F. Khambata was the Port Health Officer.

Incoming vessels.—Seventy vessels including 11 pilgrim ships and 3 country craft, carrying 17,308 members of crews and passengers, entered the port under the " Quarantine " flag. Of these 54 came from the Red Sea, European and African ports, 2 from the Persian Gulf and 14 from other ports. One case of small-pox, 8 of chicken-pox and 2 of measles were detected. Three deaths from pneumonia were reported to have occurred on 3 vessels which arrived from Jeddah.

Outgoing vessels.—A total of 701 were granted bills of health. Two passengers, one in the infective stage of small-pox and the other suffering from chicken-pox, were prevented from embarking.

Pilgrim traffic.—Only one outgoing ship carrying 1,659 pilgrims sailed direct from Karachi on the 24th January, 1935; 10 others from Bombay embarked 5,133 additional pilgrims. Eleven incoming ships arrived with 11,568 pilgrims, of whom 8,226 disembarked; the rest continued their voyage to Bombay. Deaths during the voyages totalled 27, all from non-infectious diseases; 5 cases of chicken-pox, one suspicious case of leprosy and 60 ships hospital cases were reported on arrival.

General—(*i*) *Rats and fleas.*—Anti-rat operations were carried out within the wharf area, 3,159 rats being trapped and killed. The average number trapped per day per 100 traps was 5·5. None was found plague infected.

(*ii*) *Port Sanitation.*—The sanitary condition of the harbour was satisfactory.

(*iii*) *Other matters.*—Provisions and stores for the use of the Asiatic crews of 31 vessels were inspected. Of the 85 samples of *ghee* analysed, 17 were found to be not genuine or unfit for human consumption.

Air-port of Karachi.

61. In view of the rapid development of aerial traffic and the necessity for applying the International Sanitary Convention for Aerial Navigation, the Government of India had under consideration measures necessary to prevent the possible introduction and spread of infectious disease brought by aeroplane. It was decided to make the Karachi air port a " Sanitary Aerodrome ", and in anticipation as an interim measure sanction was given in July, 1935 to the

appointment of a Health Officer for the Karachi Airport. This officer was placed under the administrative control of the Public Health Commissioner with instructions to carry out medical inspection of all planes, passengers and crews arriving at and departing from the Karachi Air Port. The Government of India also sanctioned the temporary appointment of a sanitary inspector for anti-mosquito work. A temporary post of sub-assistant surgeon was also created from October, 1935.

The Government of India have also had under consideration the question of providing the airport with medical inspection rooms, a first-aid post, a disinfection station, an isolation hospital and equipment for anti-mosquito operations. Regulations have also been framed similar to those in use for seaports for the prevention of the introduction of infectious diseases into India by air. Pending the erection of the necessary accommodation arrangements have been made for the segregation of cases of infectious diseases, except yellow fever, in the Municipal Epidemic Diseases Hospital.

During 1935, bills of health were issued to 260 west bound aircraft ; members of crews and passengers totalled 933 and 1,029, respectively. Eighty-two aircraft left the port for the East carrying 291 members of crews and 294 passengers. No cases of communicable disease were reported.

The air Companies operating from and to Karachi were (1) The Imperial Airways, Limited, (2) French Air Mail and (3) the Royal Dutch Air Mail. In addition 11 British planes, 2 French planes and one Egyptian private plane used the air-port.

Water is supplied from the Karachi Municipal mains and sanitation was satisfactory.

Port of Calcutta.

62. Lt. A. D. Campbell, I.M.D., acted as Port Health Officer. Other health staff included three assistant Port Health Officers, one woman medical inspector, one sanitary inspector and one fumigation inspector.

Inward traffic.—As before only infected or suspected incoming vessels were examined. Consequently, of the 1,192 vessels which entered the port, only 9 with 930 members of the crews and 1,496 passengers were subjected to inspection ; none was found to have infectious disease on board. There were 3 deaths, one each from cholera, sunstroke and " other causes " among the 364 European seamen admitted to hospitals. Of the total, 43 admissions were due to simple fever, 33 to dysentery, 17 to diarrhœa, 12 to malaria, 6 to influenza, 3 each to enteric fever and cholera, 1 to sunstroke and 246 to " other causes ". Amongst Asiatic seamen there were 180 admissions and 19 deaths, of which 47 and 14 were due to cholera, 8 and 1 to dysentery, 114 and 4 to " other causes ", 2 non-fatal admissions for diarrhœa, 6 for malaria, 1 for simple fever and 2 for influenza.

Outward traffic.—Of the 1,203 vessels which left the port 893 vessels proceeding to ports beyond India, with 67,231 members of crews and 41,060 passengers, were inspected. Six cases of cholera were removed to hospital from five out-going ships during their stay in the harbour. 934 persons were vaccinated. 7,277 boats, lighters, etc., were inspected by the sanitary inspector and 91 cases of sickness were reported from the harbour.

General—(i) Disinfection and fumigation.—Owing to the freedom of the town and port from plague, routine disinfection of clothing and bedding was not enforced in the case of Asiatic and African members of crews and third class deck passengers of ships leaving for ports beyond British India. Fourteen

seagoing vessels, 28 inland steamers, flats and launches and 29 lighters, *bhars* and *dinghis* were disinfected. 51 ships were fumigated.

(*ii*) *Rats and fleas.*—Fifty one deratisation certificates and 61 deratisation exemption certificates were issued. Of the 811 rats examined none was found infected.

(*iii*) *Port sanitation.*—The sanitation of the Kidderpore docks was as usual looked after by the Port Commissioners. The sanitary inspector inspected cargo boats plying in the river and supervised the conservancy arrangements at the bathing and burning *Ghats* within the limits of the port.

(*iv*) *Miscellaneous.*—Municipal filtered water was supplied to the shipping; it was satisfactory both in quality and quantity. Ships' provisions generally were found satisfactory.

(*v*) *Pilgrim traffic.*—Only one ship with 526 pilgrims on board left for the Hedjaz.

Port of Madras.

63. *Staff and Administration.*—The D. P. H. continued to be in charge of Port Health administration and an A. D. P. H. acted as part-time P. H. O. The other staff included a sub-assistant surgeon in charge of the disinfection shed and a nurse for inspection of female passengers.

Incoming vessels.—These numbered 660 and carried on board 56,143 members of crews and 53,496 passengers. Only one case of chickenpox and one of measles were landed and sent to the infectious diseases hospital.

Outgoing vessels.—A total of 639 vessels carrying 55,237 members of crews and 72,906 passengers were inspected and granted bills of health.

Disinfection.—The bedding and clothing of deck passengers and crews landing and embarking at this port, were disinfected at the discretion of the P. H. O.

Rats.—No mortality among rats was found on any vessel.

Port of Rangoon.

64. *Staff.*—Dr. J. A. Anklesaria, D. P. H. was Port Health Officer.

Incoming Vessels.—Altogether 850 vessels from Indian and 419 from foreign ports, carrying 118,937 members of crews and 259,646 passengers were inspected. Thirty-four cases of infectious disease were reported on 27 vessels, these comprised 7 cases of cholera, 3 smallpox, 17 chickenpox and 7 measles. Except for one death from cholera at sea, one case of chickenpox in this ship's hospital (a through passenger) and 2 cases of measles, all were removed to the Contagious Diseases Hospital. In addition, 8 unreported cases of small-pox, 26 cases of chickenpox and 1 case of measles were detected on 22 vessels during medical inspection and removed to hospital. Twenty-two lepers were also detected; except one sent to a leprosy asylum and another who was a through passenger all were allowed to proceed to their homes. Thirteen deaths from non-infectious diseases were also reported on 12 vessels.

Of a total of 265,637 passengers examined under the Burma Vaccination Act, 161,136 were found unprotected and were vaccinated by the Port Health Staff. In addition, 36 vaccinations were performed among members of crews.

The effects of 1,983 members of crew and 3,265 passengers were disinfected.

Outgoing vessels.—The effects of 35,376 members of crews and 13,521 deck passengers on 551 vessels which were proceeding to ports beyond India were disinfected ; whilst 10,875 European members of crews and 4,018 saloon passengers were inspected. Vaccinations totalled—crews 289 and passengers 2,904. Baggage coolies numbering 3,500 were inspected and their clothes and uniforms disinfected prior to handling baggage.

Two deaths from non-infectious diseases, 1 case each of cholera, scarlet fever and beri-beri, 9 of chickenpox, 4 of mumps, and 2 others were reported on vessels in the harbour.

Of 3,195 new members of crews inspected prior to signing ships' articles, 3,146 were passed fit.

General—(i) Disinfection and Fumigation.—Thirty-nine vessels were fumigated to comply with the measures in force at their ports of destination. Deratisation exemption certificates were issued to 34 vessels after inspection. On these last 121 rats were destroyed. 812 rats were destroyed in empty vessels by fumigation. The number of rats destroyed on loaded vessels was not ascertained as they left the harbour immediately after fumigation.

(ii) Rats and fleas.—Measures to prevent the entry of rats to vessels lying at the wharves were inspected at frequent intervals. The total number of rats killed was 5,257 and of 2,069 examined none was found infected. A total of 8,676 rat burrows were treated with cyanogas, 17,080 connecting burrows were blocked and 24,681 rat holes were smoked.

(iii) Port sanitation.—The sanitation of the Port Commissioner's area was kept at a high standard.

(iv) Other matters.—Anti-cholera inoculations, totalling 1,640 were carried out on passengers and members of crews. 3,077 employees in the port were vaccinated. Provisions for Asiatic lascar crews on 363 vessels were inspected ; of the 219 samples analysed, 26 were found bad or adulterated.

Port of Aden.

65. *Staff.*—Lt.-Col. E. S. Phipson, I.M.S., held charge of the office of Port Health Officer except for a period of leave, when Lt.-Col. J. B. Hanafin, I.M.S. was incharge.

Incoming and outgoing traffic.—Bills of Health were granted to 1,864 vessels. Eight vessels arrived with infectious disease on board.

Pilgrim traffic.—Eight ships carrying pilgrims passed through the port; all were medically examined but were not granted pratique. Aden is not a recognised pilgrim port but all pilgrims embarking for Jeddah are medically inspected, inoculated against cholera and vaccinated against smallpox if not already protected. Pilgrim passengers arriving from Mukalla *en route* to the Hedjaz *via* Aden are inoculated on board by ship surgeons.

Quarantine.—Of the four quarantine islands in the harbour, only Flint and Twin islands are now kept ready to receive patients ; the other two are not now used for quarantine purposes.

Deratisation and disinfection.—Aden is not recognised internationally as a port which issues deratisation and exemption certificates but a Clayton apparatus is maintained for the fumigation of smaller vessels engaged in international coastal service, though not as a routine measure. The apparatus is maintained by a local firm, which charges rates fixed according to the size of the ship.

General.—The health and sanitation of the port were satisfactory.

Kamaran Quarantine Station, Red Sea.

66. The pilgrimage of 1934-35, which lasted for over 4 months, opened with arrival of the M. S. " Polyphemus " from the Netherlands East Indies on the 29th October 1934, and closed with the departure of the S. S. " Akbar " from India on 9th March, 1935. Twenty-six vessels, 22 British and 4 Dutch and carrying 18,454 pilgrims passed through Kamaran and were dealt with according to the measures prescribed for " healthy " ships under Article XX of the Schedule to the Anglo-Dutch Agreement of 1926. Of the pilgrims 13,376 were from British India, 3,424 from the Netherlands East Indies, 1,386 from the Straits Settlements and 268 from the Arabian Coast.

The health of the pilgrims was good ; only 5 deaths occurred on steamers from British India, 4 on those from the Netherlands East Indies and one on those from the Straits. Only 268 pilgrims were landed, whilst 19 British and 4 Dutch vessels were exempted from landing their passengers. 131 uninoculated pilgrims on the S.S. " Khosrou " who had embarked at Aden, were inoculated when the vessel called at Kamaran.

SECTION VI.

VACCINATION AGAINST SMALLPOX.

A.—British India.

General.

67. With an increase in the smallpox deaths the number of vaccinations increased correspondingly by over 2 millions to a total of 25,356,725. Primary vaccination operations increased by 494,914 and revaccinations by 1,592,587. Nearly 97 % of the primary cases and 46 % of the revaccinations were successful. No cases of post-vaccinal encephalitis were recorded. In most provinces, the number of operations was higher than in the previous year, the largest difference being recorded in the Punjab.

Of the 9,698,794 registered infants, only 45 % were successfully vaccinated. This low percentage gives a clear indication of the generally backward state of protection in this country.

Details for each province will be found in the Appendix to this Section, page 244. Success rates for the different provinces are given in the graph facing page 114.

Vaccine Institutes and Supply of Vaccine.

68. Glycerinated lymph continued to be used throughout British India. The N. W. F. P. as usual obtained its supplies from the Punjab Vaccine Institute. The large and sudden demands for lymph made on the Punjab Institute for vaccination of the Quetta refugees were met in full. The quality of the lymph from all provincial institutes was reported to be of high standard. In the Burma Institute, seed lymph was rejuvenated by passing through the modified Nijland cycle.

Yields in grammes of lymph obtained at the various vaccine depôts are given below :—

	Buffalo calf.	Ox calf.
Punjab	122·3	33·9
U. P.	61·6	23·6
B. & O.	51·1	33·0
Bengal	29·0	26·9
C. P.	70·5	39·2
Bombay	19·0	24·9
Madras	22·2*	26·0
Assam	..	24·5
Burma	545·8	75·8

Tests.—In the Punjab each brew of vaccine was subjected to bacteriological and clinical examination and examined both aerobically and anaerobically for the presence of disease-producing organisms. When found free from pathogenic organisms, the potency of the lymph was tested. No brew was issued unless it gave cent per cent case and insertion success.

In U. P. bacteriological tests were always carried out before issue of vaccine. All the tests indicated complete absence of streptococci and gas-producing anaerobes and the number of viable organisms was in every case less than the prescribed standard of 5,000 per c.c. of lymph. Batches of lymph were chloroformed and issued only when subsequent tests showed adequate reduction of organisms. Rabbits were used to test potency, a number of

*For seed purposes.

batches being pooled and diluted 1 in 500 to 1 in 8,000. These tests indicated a uniformly good quality. The potency of the vaccine was found high enough to permit of a 1 in 7 dilution instead of the usual 1 in 5.

In Bengal all lymph was tested bacteriologically for purity and potency. None was issued without preliminary tests for efficiency.

In Bombay tests for purity and potency were as usual always made.

At the King Institute, Guindy, the usual laboratory tests proved the lymph to be of satisfactory potency. All batches were as usual subjected to detailed bacteriological examination both immediately after manufacture and at the time of issue. All supplies were diluted 1 in 7 and treated with clove-oil immediately before issue.

In Burma, the lymph before issue was subjected to animal tests for bacteria and to Calmette-Guerin's international potency test on rabbits. The standard in use was 100 % success without undue inflammation.

Table VI (*i*) gives details of the lymph produced by and issued from provincial institutes.

TABLE VI (*i*).

Vaccine Institutes.	Number of doses.	
	Output.	Issues.
N.-W. F. P. } Punjab } Lahore	8,036,470	6,941,810
U. P., Patwa Dangar	4,003,700	3,352,850
B. & O., Namkum (Ranchi)	2,998,183	3,298,463
Bengal, Calcutta	6,086,730	9,302,292
C. P., Nagpur	1,028,520	771,980
Bombay, Belgaum	1,974,935	1,729,920
Madras, Guindy *	7,196,200	4,714,830
Assam, Shillong	1,100,209	1,057,845
Burma, Meiktila	2,270,790	1,743,849

* For the period 1st October, 1934, to 30th September, 1935 at 2 insertions per case.

In the U. P. investigations were made into the cause of failure of the calves to give good lymph supplies. The seed lymph was first tested and its excellent quality proved that this was not the cause. Calves from different areas were then tested and only those animals showing relatively high susceptibility to vaccinia were used. The quality of seed lymph was further improved by careful animal passages. This resulted in an increase of over 5 grammes per animal in the average yield of pulp. The method of chloroforming vaccine lymph was further developed and a chemical test, based on the Guaresche-Lustgarten reaction, was adopted to ensure complete absence of chloroform.

The wastage of lymph in various areas was further investigated and measures were taken to minimise this loss. Deterioration of vaccine in transit during the hot months was minimised to some extent by packing the vaccine in cotton wool soaked in ice cold water ; evaporation helped to keep the vaccine cool.

Field tests were carried out on children and only vaccine giving 100 per cent. case success and approximately 100 % insertion success in primary cases was issued. All samples gave 100 % case success in a dilution of 1 in 7½, but to provide a margin for possible deterioration vaccine issued for general use was diluted only 1 in 5 except for a few weeks during the cooler

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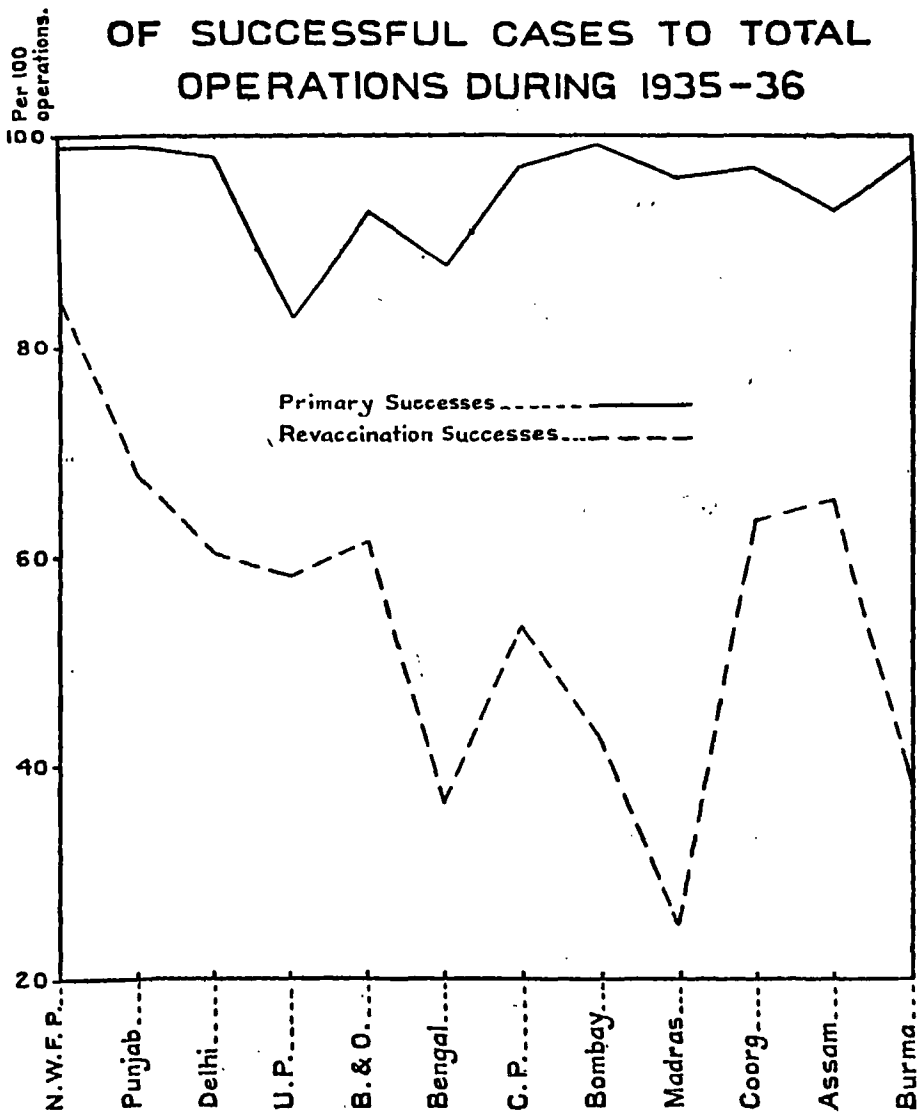
VACCINATION GRAPH SHOWING PERCENTAGES OF SUCCESSFUL CASES TO TOTAL OPERATIONS DURING 1935-36



months when a 1 in 6¼ dilution was found to give satisfactory results. Owing to the increased potency of the lymph, the suggestion was made that vaccination operations might commence from 1st October instead of 1st November. An experimental test was made in 15 municipalities and 20 districts and the results were so encouraging that the scheme will be given a further trial in 1936.

In B. & O. it was found that calves vaccinated with humanized lymph usually took longer to develop than those vaccinated with animal virus. Guinea-pigs were again tried for regeneration of seed vaccine and for the testing of issue vaccine, but the results were not satisfactory.

At the King Institute, Guindy, the following researches were made :—

(*i*) *Cultivation of vaccinia virus in the chorio-allantoic membrane of the chick-embryo.*—The researches outlined in the previous year were continued. The virus had now passed through 82 serial passages in eggs. The technique of inoculation in eggs was improved. With the new technique, the potency of the cultured virus in later passages increased considerably. The immunizing properties were investigated and found to be equal to those obtained with routine calf-lymph. Keeping qualitites were not satisfactory. On serial passages no alterations in the character of the virus were noted. This cultured virus was used in the field along with routine calf-lymph and comparable results were obtained. Further work was in progress.

(*ii*) *Purification of vaccinia virus as obtained from calf-lymph.*—Attempts were made to prepare a bacteria-free suspension of vaccinia virus as obtained from crude calf-lymph by simple filtration through a Berkefeld ' V ' filter and by the technique of elution with casein-alumina-gel. Suspensions of pure elementary bodies from lapine were also prepared. Immunizing and storage qualities of these pure suspensions of virus in different substances such as broth, glycerine water, semi solid agar, and gum-acacia were being studied. A comparative study of the immunological properties of active, attenuated and inactive virus was also in progress.

(*iii*) *Cultivation of different viruses on the chorio-allantoic membrane of the chick-embryo.*—Virus of varicella has been successfully cultivated on the chorio-allantoic membrane and a few serial passages were made.

(*iv*) *Attempts to modify Nijland's seed cycle.*—Experiments initiated last year in respect of the substitution of humanized lymph for rabbit lymph in the seed cycle were continued. Lymph so manufactured was found to give as good results as the routine lymph. Tested in the experimental range it gave 100 % case and insertion success rates. Results from different parts of the Presidency were comparable with the ordinary lymph and gave on an average a 90 % insertion success rate.

Training.—At the Punjab Vaccine Institute, 16 vaccinators, 48 private individuals and 38 students of Dayanand Ayurvedic and Unani Tibbia Colleges were trained in the technique of vaccination and in elementary principles of hygiene. In addition, 46 students of the sanitary inspectors' class, 13 health visitors and 89 medical students were given a course of lectures in vaccination. In the C. P. the usual seven weeks course of training was given to 106 new vaccinators. Two teachers and two assistant superintendents of vaccination were also trained. At the Vaccine Institute, Belgaum, a training class for vaccinators was held and 27 candidates passed the examination. In addition, 5 medical officers of health, 1 sub-inspector of sanitation, 1 inspector of sanitation and vaccination, 1 chief sanitary inspector and 2 clerks of the public health department were given special training in the preparation and preservation of lymph and in the theory and practice of vaccination.

In Madras, a certain number of women vaccinators were trained. In Burma the vaccination training class was held in abeyance.

Vaccination in Provinces.

69. *N. W. F. P.*—The staff consisted of 6 superintendents of vaccination and 49 vaccinators (including 5 temporary vaccinators). Successful primary vaccinations numbered 135,427, including 78,558 infants under 1 year of age and 47,461 children between one and 6 years. Successful revaccinations totalled 75,268. Of the total, 26,575 were done in Political Agencies and 5,864 (1,464 primary and 4,400 revaccinations) in cantonments. The average number of vaccinations performed by each vaccinator was 4,908 a considerable reduction as compared with the previous year.

70. *Punjab.*—The number of vaccinators employed by local bodies increased by 10 to 548. Appreciable increases in both primary and secondary vaccinations were recorded. The larger number of primary cases was chiefly due to the increase in registered births. But it is worth noting that the number of operations per smallpox death was over four times that for the record year 1932-33. Omitting the figures for Lahore city, where a severe epidemic occurred during that year, the present figures compare favourably.

As regards rural areas, the number of vaccination operations was the highest on record, exceeding those for 1932-33 by 251,602. These are satisfactory results when it is remembered that there was no epidemic of smallpox. The average number of operations performed by each vaccinator was 6,115. A few women vaccinators were employed and municipalities and local boards should be encouraged to make more use of women for this work. Although there was an increase in total expenditure, the average cost of each successful case fell slightly.

71. *Delhi Province.*—The four municipalities employed 8 whole time vaccinators; in rural areas there were three. With a higher smallpox incidence the numbers of vaccinations and revaccinations both showed an increase as compared with the previous year. The average number of vaccinations performed by each vaccinator was 4,040 in urban and 4,252 in rural areas ; these cannot be said to be satisfactory and greater efforts should be made. Revaccination amongst women who observe strict *purdah* continued to be a difficult problem.

72. *United Provinces.*—The number of vaccinators was increased to 985. The increase of 114,729 in total operations was mostly due to greater activity in urban areas. The average number of operations performed by each vaccinator was only 1,985, a figure which might be multiplied by three without much difficulty and with a corresponding fall in average cost. The percentage of successful operations to total births was only 56 % among children under 1 year.

Of the total of 1,972,458 operations, 1,399,352 primary and 224,251 revaccinations were performed in rural areas ; 205,398 and 139,797 in urban areas ; 52 and 327 in dispensaries ; 103 and 269 by private medical practitioners; and 813 and 2,096 at railway dispensaries. A total of 3,959 schools were inspected for vaccination purposes and 73,035 scholars were vaccinated as a result. In spite of an increase in total expenditure, the average cost per successful case fell slightly.

73. *Bihar and Orissa.*—The provincial staff consisted of 11 district inspectors, 36 sub-inspectors and 1,334 vaccinators. Licensed vaccinators continued to be generally employed in rural areas, but the Government made provision

for 100 temporary vaccinators to be employed during smallpox epidemics. The average number of operations performed by each vaccinator was only 1,498. Although this shows an increase over the previous year, it cannot be regarded as a satisfactory outturn of work. Total vaccination operations increased by 164,049 but another decrease occurred in the success rate which was only 70 %. In municipal areas, the number of operations increased by 99,097 to 217,985 of which only 91,387 were successful. Success rates were 87 % in primary cases and 29 % in revaccinations as against 98% and 50 % during the previous year. It is hoped that these large decreases have been made the subject of investigation. Vaccination operations performed in rural areas numbered 1,779,963 and success rates were 97 % in primary cases and 38 % in revaccinations as compared with 99 % and 38 % during the previous year.

Unprotected children under one year numbered 1,190,994. Of these only 266 p. m. were successfully vaccinated, but this figure was 645 p. m. in municipal areas. So long as nearly two-thirds of the total infant population in rural areas and one-third of that in municipal areas remain unprotected, vaccination work can only be described as unsatisfactory.

74. *Bengal Presidency.*—The number of vaccinators increased from 1,738 to 2,043 in rural areas and from 165 to 240 in municipalities. Due to an epidemic of smallpox the number of vaccinations increased by 2,217,721 to the record total of 9,114,092. Even then the average number of operations performed by each vaccinator was only 3,886, which still leaves considerable scope for improvement. Although primary cases increased by 271,664 and revaccinations by 1,946,057, and the numbers of children under one year and between one and 6 years successfully vaccinated were 340,560 and 1,670,842, respectively, nevertheless over four-fifths of the population still remain unprotected. In rural areas 7,309,300 vaccinations (2,709,529 primary and 4,599,771 revaccinations) were performed, whilst in municipal areas the total was 1,376,293 against 589,707 in the previous year. In tea gardens 84,889 vaccinations were performed, in factories 106,450, in railways 110,395, on steamers 759 and in jails 124,423.

Of the available infant population, 241 p. m. were successfully vaccinated, the rates being 216 p. m. in rural areas and 751 p. m. in municipalities. The low percentage of protected infants was ascribed to the general reluctance of parents and guardians to have their children vaccinated before they reach the age of one year; in some districts the prevalence of malaria and other epidemic and endemic diseases was given as the cause.

Although there was an increase in total expenditure the average cost per successful case fell slightly. The rotary lancet is now used practically all over the province.

75. *Central Provinces.*—The vaccination staff comprised 36 assistant superintendents and 355 vaccinators. Of the total operations, 561,883 primary and 158,673 revaccinations were performed by district vaccinators, 4,430 by dispensary staffs and 9,419 by other agencies. The average number of operations done by each vaccinator was only 2,152, a figure which might easily be doubled. In municipalities, of 57,113 unprotected infants, 44,652 or 78 % were vaccinated. Although there was an increase in total expenditure on vaccition, the average cost per successful case fell slightly.

76. *Bombay Presidency.*—Of the total operations performed, the percentage of success was 99·43 %. Seventy-one per cent. of the primary cases were infants under 1 year of age and 26 % children between 1 and 6

years. Of the revaccination cases inspected, 42 % were successful. The average number of operations performed by each vaccinator was only 2,808, another figure which might easily be doubled. Vaccination work was regularly carried out in police lines and outposts, and at important fair centres.

At Karachi, the temporary establishment appointed for the vaccination of pilgrims proceeding to the Hedjaz vaccinated 4,924,—3,941 male and 983 female,—pilgrims between November, 1935 and February, 1936 at a cost of Rs. 638.

77. *Madras Presidency.*—The number of vaccinators was increased by one to 880. In addition, 278 health inspectors were employed on vaccination work. The number of operations fell from 5,223,920 to 4,275,890, the decrease being wholly recorded under revaccinations as primary vaccinations showed an increase. The decrease was to a certain extent due to the decreased prevalence of smallpox, but the wide-spread of cholera in some districts and the diversion of vaccinators for cholera duty also adversely affected the outturn of work. Each vaccinator performed 4,684 vaccinations on an average, a figure which is only fairly satisfactory. The number of operations performed in rural areas decreased to 3,725,295 (1,277,336 primary and 2,447,959 revaccinations). Successful vaccinations among children under 1 year of age numbered 534,994, the proportion of vaccinations to registered births varying from 20 % to 54 % in different districts. In municipalities 133,379 primary and 379,956 revaccination operations were performed and the proportion of vaccinations to registered births varied between 15 % and 97 %. In both districts and municipalities a few women vaccinators were employed and an additional number was trained for vaccination work among *purdah* women.

The average expenditure per successful vaccination in districts varied from Re. 0-3-6 to Rs. 1-0-4 ; in municipalities it varied from As. 2-7 to Rs. 1-3-11.

78. *Coorg.*—A total of 13,310 males and 7,174 females were vaccinated ; 18,207 were done in rural areas, 2,187 in urban areas and 90 in dispensaries. In the two towns in Coorg, where the Vaccination Act is in force, 232 infants were successfully vaccinated. Each vaccinator performed on an average 2,039 operations—a very unsatisfactory figure.

79. *Assam.*—The vaccination staff included 9 inspectors, 30 sub-inspectors and 434 departmental vaccinators. Vaccination operations increased by 147,749 (17,197 primary and 130,552 revaccinations), the total number performed being 852,685. Of this number, 767,542 were done by departmental vaccinators ; 16,176 by dispensary staff, 62,543 in tea-gardens, 5,474 in jails, police hospitals, etc., and 943 by railway staff. Each vaccinator performed on an average 1,965 vaccinations, a very small outturn. Of 6,057 unprotected infants registered in towns where vaccination is compulsory, 52% were successfully vaccinated and success rates varied between 4% and 93 %.

80. *Burma.*—The staff comprised 38 district superintendents, 112 part-time supervising officers, 25 inspectors and 350 vaccinators. Additional temporary staff was employed to deal with epidemics. The average number of vaccinations performed by each vaccinator was 3,750,—a figure which is susceptible of considerable improvement. Of the 1,052,126 operations performed in rural

areas, 543,984 were primary and 508,142 revaccinations and the percentages of success were 98 % and 37 % respectively. Of the 498,905 primary successful operations, 137,830 were infants under one year of age and 275,636 children between one and six years.

In urban areas, excluding cantonments, 261,108 operations were performed. Of the 53,532 primary operations about 98 % were successful; of the 207,576 revaccinations, 39 % of the verified cases were successful. Other vaccinations were 1,558 in cantonments, 3,602 by railway dispensary staff, 2,524 by Government dispensary staff, 1,349 by private practitioners, 40,818 in jails and 182,250 immigrants at the ports of Rangoon and Akyab.

81. *Andamans.*—Vaccinations numbered 578 (342 primary, 234 secondary and 2 revaccinations), of which 433 were successful. Of the vaccinations done with Java dried lymph only 4 were successful, whilst amongst the 566 done with glycerinated lymph 429 were successful.

Compulsory Vaccination.

82. Table VI (*ii*) gives the number of towns and districts in which compulsory vaccination is in force.

TABLE VI (*ii*).

	Towns.		Districts.	
	Total No.	No. in which Vaccination Act is in force.	Total No.	No. in which Vaccination Act is in force.
British India—	1,524	1,180	256	117
N.-W. F. P. . .	17	10	5	..
Punjab . . .	177	171	29	27
Delhi . . .	6	6	1	1
U. P. . . .	439	243	48	..
B. & O. . . .	59	58	21	10*
Bengal . . .	119	119	27	26
C. P. . . .	110	88	19	..
Bombay . . .	154	50	28	1†
Madras . . .	328	328	25	25
Coorg . . .	5	5	1	..
Assam . .	31	24	14	—
Burma . . .	74	74	37	27
Ajmer-Merwara .	5	4	1	..

*Compulsory vaccination was also in force in certain selected areas of 4 other districts.

†In 10 villages in Belgaum District.

In addition, rules for extension of the Vaccination Act to certain groups of villages in six districts in the Central Provinces were promulgated during 1935 and 1936. Revaccination was compulsory throughout Madras Presidency and in 48 towns and 21 districts in Burma. In other provinces, there is still great scope for extension of compulsory vaccination.

B.—Indian States.

83. *Punjab States.*—Statistics of those Indian States which maintain their own establishments are given below:—

	Vaccinations.		Success-rates.	
	P.	R.	P.	R.
Patiala	64,655	51,585	99	80
Bahawalpur	35,604	2,058	100	97
Nabha	12,113	2,110	96	79
Jind	11,316	243	99	43
Kapurthala	5,995	5,477	96	56
Faridkot	8,393	2,924	99	50

Gujerat States Agency.—Totals of 37,522 primary and 4,725 revaccinations were performed. The success rate was 98 % for primary cases and 77 % for revaccinations. The results of 5 % of primary and 52 % of revaccinations could not be ascertained.

Shan States (Burma).—The staff comprised 2 district superintendents of vaccination, 2 part-time supervising officers and 45 vaccinators. Vaccinations performed were 75,204 (54,477 primary and 20,727 revaccinations). Of the verified primary cases and revaccinations 97 % and 75 % respectively were successful. The average cost per successful case was Re. 0-8-4.

Mysore State.—Vaccination operations numbered 406,816. Of these 389,689 (226,069 primary and 180,747 revaccinations) were done by district board and municipal vaccinators and 17,127 (8,553 primary and 8,574 revaccinations) by medical subordinates. Amongst the former success rates were 93 % and 23 % in primary and revaccination cases respectively; among the latter, success rates were 91 % and 44 %. The cost per successful case was Re. 0-4-5.

The potency of the lymph continued high and the bacterial content was kept within safe limits. All lymph was bacteriologically examined in the Vaccine Institute and the results were confirmed by tests at the Public Health Institute. In addition, the potency of the lymph was tested before it was sent out. Lanoline lymph sufficient for 379,162 cases and glycerine lymph for 69,855 cases were issued.

SECTION VII.

PUBLIC HEALTH WORKS.

A.—British India.

General.

84. It is difficult to add anything to the remarks made in previous reports in regard to the importance of environmental hygiene and to the general failure of local authorities throughout India to provide good water-supplies, good drainage and satisfactory systems for the removal and disposal of refuse and sewage. Until municipal committees are prepared to provide the funds for these primary essentials of environmental hygiene, urban populations cannot hope to enjoy a reasonable standard of health. In this connection there is considerable scope for the employment of trained sanitary engineers, but until public opinion becomes sufficiently vociferous in its demand for health amenities, it is unlikely that many students of the engineering colleges will attempt to specialise in this branch of their profession. It may be hoped that with the opening of the sanitary engineering section in the All-India Institute of Hygiene and Public Health, the importance of pure water, pure air and pure environment will persistently be stressed by health officers and by others passing out of the Institute who may be employed by municipal boards. Eighty-eight per cent. of the urban populations in towns with a population of over 50,000, 57 % of the population in towns with a population of 30,000—50,000 and 19 % in those with a population of below 30,000 enjoyed the benefits of a reasonably pure water-supply. Table A in Appendix VI on page 246 gives details of towns having reasonably pure water-supplies in different provinces.

Tables VII (*i*) and (*ii*) give available details of the income and expenditure on public health, conservancy, water-supply and drainage in municipalities and district boards during the year 1934-35.

TABLE VII (*i*).—*Provincial expenditure in Municipalities.*

	Income.	Expenditure.	Expenditure on P. H. per cent. of income.	Expenditure on—		
				Conservancy.	Water supply.	Drainage.
	Rs.	Rs.		Rs.	Rs.	Rs.
British India	**17,59,16,528**	**4,27,43,537**	**24**	**1,77,08,044**	**1,07,11,605**	**45,09,800**
N.-W. F. P.*	24,46,493	4,35,329	18	2,10,752	47,119	36,189
Punjab .	1,81,55,526	45,18,951	25	15,74,082	14,14,516	8,29,114
Delhi† .	79,59,699	11,49,227	14	3,00,134	2,74,113	1,48,032
U. P. .	2,15,99,598	60,51,261	28	25,58,070	20,72,927	7,22,236
B. & O. .	78,15,841	24,16,168	31	12,15,075	6,25,665	3,98,328
Bengal .	1,13,92,693	47,86,558	42	26,09,596	10,12,699	3,35,298
C. P. .	86,05,345	22,47,526	26	11,61,056	5,14,714	2,48,686
Bombay* .	4,46,10,979	71,51,182	16	30,55,620	22,44,709	8,46,670
Madras .	2,59,54,238	80,18,393	31	22,14,753	13,63,235	5,95,076
Assam* .	14,72,254	5,38,982	37	2,90,242	1,67,499	27,576
Burma .	2,59,03,862	54,39,960	21	25,18,664	9,74,409	3,22,595

* Figures for the year 1935-36.
† Figures for 1935.

TABLE VII (*ii*) *Provincial expenditure by district boards.*

	Income.	Expenditure.	Percentage of Expenditure on public health to income.	Expenditure on— Conservancy.	Water-supply.	Drainage.
	Rs.	Rs.		Rs.	Rs.	Rs.
British India	**14,46,26,106**	**66,85,026**	**5**	**5,26,364**	**13,39,614**	**35,747**
N.-W. F. P. *	24,93,676	81,505	3	5,364	13,977	1,761
Punjab	2,33,53,882	6,23,770	3	‡	‡	‡
Delhi†	2,82,323	13,290	5	..	..	..
U. P.	2,32,55,250	5,99,614	3	11,350	27,372	3,246
B. & O.	1,96,60,065	7,19,053	4	3,22,451	234,604	.. 4,512
Bengal	2,15,08,135	27,38,356	13	‡	630,381	24,983
C. P.	1,01,01,541	1,98,484	2	‡	25,633	..
Bombay	2,91,70,512	8,05,116	3	‡	323,366	..
Madras	Figures not available.					
Assam	38,07,378	1,27,317	3	‡	57,380	781
Burma	1,09,93,344	7,78,521	7	1,87,199	26,901	464

* Figures for 1935-36.

† Figures for 1935.

‡ Figures not available.

North West Frontier Province.

85. Expenditure on public health measures in municipal towns and notified areas increased by about one-fourth as compared with the previous year whilst that of district boards fell by about one-eighth.

Government grants-in-aid to municipalities and notified area committees for public health purposes amounted to Rs. 19,611, including Rs. 6,739 for sanitary purposes in Peshawar, Rs. 1,600 for sanitary improvements in Tank notified area and Rs. 7,000 for the improvement of water-supplies at Tank. Similar grants to district boards amounted to Rs. 9,000 including Rs. 5,000 for the improvement of sanitary conditions of Manshera and Rs. 2,000 for the improvement of drains in Nowdeh village.

Water-supply schemes amounting to Rs. 5,67,000 in towns and Rs. 1,86,992 in rural areas and other sanitary works amounting to Rs. 1,42,763 in towns and Rs. 1,79,500 in rural areas are pending for lack of funds.

No appreciable change was reported in municipal water-supplies. Conservancy arrangements in the towns are still primitive; few trenching or rubbish pits exist. No arrangements are in force for the cleansing and sanitary improvement of villages. No rural piped water-supply has been provided and, even when new wells are constructed, these do not seem to be provided with parapets. Sanitary defects and suggestions for their improvement were as usual brought to the notice of the urban authorities by the Director and Assistant Director of Public Health. The D. P. H. remarks that drainage, water-supplies and conservancy in municipal towns are all still far below reasonable standards, inspite of repeated reports by the Public Health Department. In rural areas no regular inspections were carried out owing to lack of District Medical Officers of Health.

Punjab.

86. In spite of the continued financial stringency and consequent reduction in grants-in-aid to local bodies, considerable progress was made in regard to new sanitary engineering works. Several important schemes were commenced

and a number of new pumping plants and other mechanical installations were installed or were in course of installation. It is estimated that mechanical installations with a total of 8,700 B. H. P. were either in existence or were in course of installation in connection with Government and municipal public health engineering works. The sanitary engineering department had under construction 20 public health projects on behalf of Government and 22 for local bodies. Good progress was made on the Montgomery drainage scheme, estimated to cost Rs. 5,97,220 and the intramural drainage system was completed. In the Okara drainage scheme, estimated to cost Rs. 2,54,167, the outfall system and collecting tanks were completed and the sullage pumping station was nearing completion. The Okara water-supply scheme was practically completed by the end of the year. The Bhiwani drainage scheme, estimated to cost Rs. 4,44,403, made good progress. The Sialkot drainage scheme, estimated to cost Rs. 4,49,881, was completed. The Superintending Engineer again comments on the failure of local bodies to maintain their sanitary and water-supply works in proper condition.

Seven preliminary and 16 new detailed projects were prepared by the sanitary engineering department and four detailed and four preliminary projects were revised. The most important of these were Ludhiana water works reorganisation (Rs. 1,08,398), Panipat water-supply skeleton scheme (Rs. 1,30,400), Multan Cantonment Saddar Bazar drainage (Rs. 1,46,450), Arafwala Mandi water-supply, Part I (Rs. 1,08,283), Chichawatni drainage scheme (Rs. 1,19,185), Pind Dadan Khan water-supply scheme (Rs. 1,38,000), Thal area, Isakhel water-supply scheme (Rs. 2,51,865), drainage of Lahore suburbs (Rs. 1,89,493) and Dajal water-supply (Rs. 1,99,114). Piped water-supplies are now in use in 48 towns.

Five projects prepared by local bodies and estimated to cost Rs. 2,21,357 were examined for technical sanction by the Public Health Circle, Punjab. These included improvements to Amritsar water-supply (Rs. 49,950), tube wells outside Masti Gate, Lahore (Rs. 26,185) and the enlargement of a sewer in Simla (Rs. 30,065).

Arrangements for the collection, removal and disposal of night soil and street sweepings in urban areas remained in the same unsatisfactory condition. Endeavours made by the health department to persuade local bodies to organise their conservancy systems suitably met with little encouragement and less success.

Rural water-supplies.—In addition to Rs. 40,930 allotted by the Sanitary Board for the improvement of water-supply in villages and to new wells and hand pumps provided by private individuals, the Government of India on the recommendation of the Punjab Government gave a grant of Rs. 2,16,918 for piped water-supplies in rural areas where dearth of drinking water was acute.

Sanitary Board (April 1935 to March 1936).—A total of Rs. 1,47,340 for urban sanitary works and rural water-supplies was placed at the disposal of the Board for grants-in-aid to local bodies. Of this sum, Rs. 1,06,407 were spent on urban and Rs. 40,930 on rural works. In urban areas, the most important works were Bhiwani drainage scheme (Rs. 70,711), Ludhiana water-supply reorganisation (Rs. 11,594) and reconditioning tube well No. 10, Multan water-works (Rs. 8,259) ; in rural areas, important works included the construction of a *pucca* tank in Hissar district (Rs. 14,000), improvement of water-supply in 25 village wells in Ambala district (Rs. 6,380), construction of a well at Taprian village, Ambala district (Rs. 5,649) and improvement of water-supply for Shah Qumais Fair, Sadhaura, Ambala district (Rs. 5,130).

Delhi Province.

87. The Joint Water Board was responsible for the supply of filtered water to the urban areas of New Delhi, Delhi City, Notified Area, Civil Lines, Notified Area, Fort, Delhi and Delhi Cantonment. Regular bacteriological examinations were carried out in the Provincial Public Health Laboratory and the quality of the water was maintained at a high standard. Owing to the length of the mains and the overtaxing of the filters, re-chlorination was carried out at all reservoirs and this process was also carefully supervised. Shahdara gets its water from deep tube-wells, but no municipal supply exists in other areas and water is provided by shallow wells.

The Kilokri Sewage Farm continued to attempt to deal with the sewage from New Delhi, Delhi City, Notified Area, Civil Lines, and the Fort, but the ultimate disposal of the sewage was not satisfactory. Large extensions of the system were carried out in New Delhi. All sewage from New Delhi along with that from the Notified Area and Delhi City was eventually distributed on land leased to cultivators. Whilst New Delhi has an excellent surface and underground drainage system, that of Delhi City is still insufficiently developed. The rural Notified Areas have no underground drainage.

Rural water-supplies are obtained either from shallow wells or from rivers and canals. Village drainage is practically non-existent.

United Provinces.

88. Expenditure on health works executed under the Superintending Engineer, Public Health Department, amounted to Rs. 30,80,194, an increase of Rs. 1·8 lakhs. Of this total, Rs. 5,03,503 were spent on original water works and special repairs, Rs. 18,91,618 on water-works maintenance, Rs. 3,54,033 on drainage works and Rs. 3,31,040 on other works. A sum of Rs. 2,14,491 was spent on constructional works. Projects to the value of Rs. 34,13,521 were finally sanctioned; others involving an expenditure of Rs. 16,40,626 were submitted but not sanctioned. Projects estimated to cost Rs. 8,34,000 were under preparation and other schemes costing Rs. 7,07,076 were delayed for want of staff.

Especially in those towns where the supply is intermittent, the quality of the water has considerably deteriorated. Although every effort to supply pure water may be made at the pumping station this is negatived by the contamination which takes place through leaky fittings when the pressure in the pipes falls. Intermittent water-supplies always militate against increase in the use of sanitary fittings and local authorities generally are averse to bringing into operation bye-laws insisting on property owners connecting up their property in such a manner as to prevent foul water discharges finding their way into the public thoroughfares and thence into the storm water channels. In Cawnpore and Lucknow, appreciable extensions of house drainage were made, but the provision of sanitary fittings was handicapped by deficiencies in the water-supply. Drainage pumping stations were generally not operated to the best advantage, the common method being to allow sewage to pond up in the main sewers before the pumps are brought into operation. This practice must result in the sewers becoming silted up and in expensive clearing operations. The protection of urban roads with tar composition has not only improved surface drainage, but the resulting freedom from dust makes it also a valuable health measure.

Rural water-supplies.—Departmental orders were issued to the district health officers of Jaunpur, Partabgarh, Rae Bareli, Fatehpur, Allahabad,

Mirzapur, Benares, Sultanpur and Fyzabad for the sanitary improvement of wells on the *pucca* roads leading to Allahabad, especially in those places used as "*paraos*" which are largely used by pilgrims. With funds provided by district boards and the Board of Public Health a large number of wells were improved. In the Gonda district, a large number of sanitary wells were constructed or improved by the Balrampur Estate and other estates under the Court of Wards, the total expenditure amounting to Rs. 25,000. Outside the health unit area in Partabgarh district about 400 notices were issued for improvement of wells.

Board of Public Health.—Of the Rs. 1,77,568 at the disposal of the Board Rs. 47,058 were spent on pilgrim centres, Rs. 70,149 on urban sanitation and Rs. 54,449 on rural and minor sanitary works. The grant for pilgrim centres included Rs. 18,766 for Gobardhan town drainage scheme, Rs. 11,397 for the construction of three tube-wells in connection with the Brindaban water-supply and Rs. 8,898 for Hardwar municipality drainage scheme. Improvements in urban sanitation included Rs. 9,259 for the extension of the Budaun municipality drainage scheme, Rs, 26,939 for the Hardoi municipality drainage scheme and Rs. 13,017 for the construction of a trial tube-well in connection with the Orai water-supply scheme. The funds placed at the disposal of the Board are quite inadequate to meet the large demands for urban and rural public health works.

Bihar and Orissa.

89. Full details of income and expenditure in municipalities and district boards are contained in tables VII (*i*) and VII (*ii*) on pages 121 and 122.

Recommendations made by the Assistant Directors of Public Health, involving minor expenditure were carried out by the municipalities themselves, but those involving higher costs such as major projects for improved drainage, slum clearance, etc., were postponed because of lack of funds.

Bengal Presidency.

90. The proportion of total receipts spent on public health measures in municipalities was 42 % as compared with 45 % during the previous year. Expenditure on markets and slaughter houses amounted to Rs. 39,382. Important municipal sanitary schemes included Hooghly-Chinsura drainage (Rs. 5,250), Uttarpara water-works (Rs. 11,368), Howrah drainage improvement (Rs. 7,986), Naihati drainage (Rs. 9,853), Kanchrapara drainage (Rs. 5,690), Nabadwip water-works (Rs. 8,073), Jessore water-supply (Rs. 5,587), Kurseong water-supply (Rs. 5,526), Dacca water-works improvement (Rs. 8,644) and Dacca drainage (Rs. 16,927).

Union boards numbering 4,738, with a total income of Rs. 90,27,793, spent Rs. 6,26,582 on water-supplies, Rs. 65,180 on drainage and Rs. 73,878 on conservancy.

Sanitary Board, Bengal.—Capital expenditure totalled Rs. 2,13,789 on water-works and Rs. 1,71,273 on sewerage works. Sketch projects for schemes estimated to cost Rs. 28,33,230 were prepared, detailed projects for Rs. 7,93,765 and detailed estimates and plans for miscellaneous works amounting to Rs. 1,65,867.

The stoppage of Government grants-in-aid to water-supply, drainage and other sanitary engineering schemes, necessitated by the adverse financial position, had an adverse effect on progress during the year. The Board, which met seven times, examined a number of schemes before their submission to

Government and generally reviewed the inspection reports of the departmental officers. Their advice was of particular value in regard to measures for the control of malaria and other mosquito-borne diseases.

Central Provinces.

91. Details of municipal income and expenditure on public health measures are given in Table VII (*i*) on page 121 of this section. As far as water-supplies were concerned, water-works for Buldana town were provided; water-supply schemes for the towns of Chhindwara and Itarsi were under consideration; Hinganghat town completed arrangements for tapping a supply from a third infilteration well; the town of Wardha was contemplating installation of mechanical filteration, was given a loan of Rs. 62,000 for provisions of an additional reservior and submitted a scheme for improvement of pumping and supply system; Nagpur municipality installed chloronomes for Gorewara and Ambajheri water-works; Harda municipality completed arrangements for pumping by electricity instead of steam; a scheme for the better protection of the water reservior at Damoh was initiated; the eroded main in Jubbulpore was under replacement; the aqueducts and the system of chlorination in Burhanpur were satisfactorily improved; and proposals for improvement of water-supply to Saugor town were framed.

Drainage was generally unsatisfactory and except for ordinary repairs and petty works, nothing was done to effect improvement. Elaborate drainage schemes for most towns are in existence, but the prevailing financial stringency stood in the way of effecting improvement. Drainage proposals from Bilaspur and Khandwa were received. Marked improvement was effected in the surface drainage of Chhindwara, Khandwa and Akola. Damoh spent sufficiently on drainage but the results were disappointing and maintenance was defective. The general situation with regard to conservancy showed no appreciable improvement. In five municipalities the public and school latrines were improved but generally the condition of private latrines and the systems of collecting night-soil were very insanitary.

Rural sanitation.—In rural areas water supply is obtained chiefly from wells, but a large number of villages have either no wells at all or the water is brackish. Even when wells are provided, the water from tanks, rivers, streams or *nalas* is preferred and this is one of the important causes of the spread of epidemics of cholera. No grants from provincial revenues for the improvement of water-supplies were made, but it was proposed to utilise 1 lakh from the Government of India grant for the construction of wells in 209 villages.

The aggregate income of the 72 villages under the Village Sanitation and Public Management Act amounted to Rs. 2,23,082 whilst total expenditure was Rs. 2,09,907, including Rs. 3,695 on water-supply, Rs. 37,799 on cleaning of village sites and Rs. 5,400 on drainage. Total receipts of town fund and other villages under the *mukaddam rules* aggregated Rs. 20,814, and of the Rs. 21,203 expended on public health Rs. 1,438 were on water-supply, Rs. 11,799 on cleaning of village sites and Rs. 140 on drainage. In the *ryotwari* villages of 7 districts a sum of Rs. 4,482 was spent on improvement of water-supplies.

Bombay Presidency.

92. In Karachi city annual expenditure on public health measures per head of population amounted approximately to Rs. 3-7-0, the average figure in other municipalities being Rs. 2-15-11. Complete sanitary surveys of 19 towns

were made and 5 towns were the subject of special inspection or report. In many cases, action was taken on suggestions made by the Assistant Directors of Public Health. Belgaum and Hyderabad constructed surface drains at a cost of Rs. 36,681 and Rs. 28,667, respectively; Dharwar, Bagalkot, Karwar, Barsi, Yawal, and Tando Adam constructed drains; Sholapur spent Rs. 2,07,444 on 6″ drains in different localities and Rs. 15,176 on storm water drains.

The Nasik system of trenching night-soil was adopted by 12 municipalities and in three cases it proved a financial success. Demonstrations of the compost system of disposal of night-soil and refuse were given at 10 different centres.

The water supplies of 8 of the larger towns were regularly sterilized and maintained their standard of purity. Improvements to drainage works were carried out in several towns.

Village Sanitary Boards.—The Sanitary Board at Siddapur in Kanara district carried out the usual conservancy work. The Sanitary Board at Shahpur Chakar in Nawabshah district whilst still in existence is reported to have done no work of any importance.

Board of Public Health.—The Board accorded approval to the preparation of drainage schemes for Surat, Ghatkopar and Amalner and for the provision of drains in the town planned areas of Baherpura.

Madras Presidency.

93. *Water-supplies.*—Water-supply schemes were under execution in four municipalities, whilst improvements or extensions were on hand in 12 municipalities. Plans and estimates for three new schemes and the investigation reports of one new and two improvement schemes were submitted during the year. In rural areas, no protected water-supplies exist but two schemes were under execution and plans and estimates for two others were under consideration.

Drainage.—Only three towns as before, had complete drainage system. Drainage works were under execution in four municipalities; plans and estimates for two urban drainage schemes were submitted to Government and for 5 others these were under preparation.

Assam.

94. Details of total income and expenditure on public health measures both in municipalities and rural areas are given in tables VII(*i*) and (*ii*) on pages 121 and 122.

The Public Works Department expended only Rs. 3,304 on the maintenance of water supplies and drainage.

Burma.

95. Of the total municipal incomes, over 21 % was spent on public health, the highest figure being Rs, 33,43,146 or nearly 61 % of the total in Pegu division. Rs. 7·50 lakhs were allotted for markets and slaughter houses whilst Rs. 36,168 were spent on epidemic charges.

Water-supply.—The Akyab Water Works scheme began to give adequate supplies to those parts of the town which previously suffered from acute shortage. In Moulmein town, the five tube-wells sunk in 1933 were under test in order to determine whether the yield of water would be sufficient for a continuous distribution system; a chlorination plant was also installed. In Bassein

the municipal committee approved of a scheme for sinking another 6-inch tube-well. In Mandalay the scheme for consolidating existing tube well water supplies and for extending the supply to other parts of the town was kept in abeyance. In Mawlaik the military police constructed a good supply by *bunding* a hill stream from which water is piped to two large storage tanks. In Lashio, Rs. 1,977 was spent on raising the *bund* and the sluice gate of the new reservoir.

In rural areas, no appreciable advance in the standard of supplies was made. The Local Government instituted an enquiry into the possibility of augmenting supplies in certain rural areas where there is a definite shortage, but district councils were inclined to assume that no improvement was possible without a grant from Government. The Director of Public Health, on the other hand, considered that much could be done to improve matters if district councils and villages relied more on their own resources. Minor improvements to tanks were reported from Hanthawaddy district. Preparations were made by the District Council for providing tanks in three villages in Myaungmya district; in Pyapon district budget provision was made for four new village tanks.

Conservancy and drainage.—The municipal committee of Moulmein town budgetted for a sum of Rs. 4,000 for the experimental introduction of a double bucket system; in Syriam town a sum of Rs. 14,500 was spent on *pucca* drains. Improvements to and extensions of *pucca* drains were carried out in ten other towns. In rural areas, 90 bore-hole latrines were constructed at Einme and 17 at Thayetmyo in Myaungmya district. In Kyaiklat township in Pyapon district a number of similar latrines were reported to be working satisfactorily. A few latrines of the same type were constructed in a few villages in Insein township for demonstration purposes.

Rural sanitary works.—Of the total income, only 7 % was spent on public health. A total of Rs. 1,60,409 were allotted for markets and slaughter houses, only Rs. 15,786 were spent on epidemic charges.

Public Health Board.—The Board remained in a state of suspended animation. As no Government funds were placed at the disposal of the Board no new sanitary engineering works could be financed.

B.—Indian States.

96. *Mysore State.*—The Bureau of Sanitary Engineering had 11 water-works under maintenance and 21 original water-works under construction. Improvements were carried out in three cases whilst estimates were prepared for 21 water-supply schemes. Seven drainage works were under construction, whilst five drainage estimates were prepared. Drainage projects for 15 places were under preparation. 36 bore-hole latrines were constructed during the year.

Federated Shan States, Burma.—Total income was Rs. 46,02,258; Rs. 2,73,264 in urban and Rs. 43,28,994 in rural areas. A total of Rs. 1,41,461 was spent on public health measures; Rs. 72,270 in urban and Rs. 69,191 in rural areas. Expenditure on water supplies amounted to Rs. 11,438 for urban areas and Rs. 2,861 for rural; and that on conservancy to Rs. 32,368 and Rs. 27,957. In urban areas Rs. 11,677 was allotted for drainage and Rs. 10,233 was spent on markets and slaughter houses.

SECTION VIII.

LABORATORIES AND MEDICAL RESEARCH.

Central Research Institute, Kasauli.*

97. Lt.-Col. J. Taylor, I.M.S., was Director of the Institute and continue to act as Editor, I. J. M. R. and I. M. R. Memoirs throughout the year. Other I.M.S. officers of the M. R. Deptt. who served on the staff were Lt.-Colonel Webster, Major Read and Captains Ahuja and Mallick.

The production of vaccines and anti-venom serum continued to be the major activity of the Institute. Anti-typhoid and anti-cholera vaccines were produced on a large scale as usual. Most of the anti-cholera vaccine was issued to Burma and Kashmir where it gave satisfactory results. Smaller quantities of influenza vaccine and mixed catarrhal vaccine were prepared and issued; the manufacture of anti-meningococcus vaccine was discontinued. Income derived from the sale of these various products, owing to increased demands was sufficient to cover the whole cost of the Institute.

The following table gives the quantities in c.cs. of vaccines and sera issued in 1934 and 1935 :—

TABLE VIII (*i*).

	1934.	1935.
Vaccines.		
Prophylactic cholera	601,590	1,836,820
Prophylactic mixed typhoid and paratyphoid (T.A.B.)	349,454	380,503
Prophylactic influenza	19,790	26,342
Prophylactic meningococcus	..	52,462
Curative (various)	9,118 doses.	10,790 doses.
Autogenous	517 doses.	660 doses.
Sera.		
Anti-venine	5,973 tubes.	5,983 doses.
Normal horse	13,820	15,900
High titre (diagnostic)	1,080	1,051

The results of an experimental study of the protective value of the cholera vaccine in animals were discussed at the Medical Research Workers' Conference held in Calcutta in December 1935. Both laboratory workers and Public Health Officers agreed that the period of expiry of the vaccine which had previously been fixed at six months should be extended to one year.

A type collection of micro-organisms was maintained and subcultures of organisms were available for issue to recognised institutions and individuals requiring these for teaching purposes, research work, vaccine manufacture or as diagnostic reagents. Bacteriological media, strains and special reagents were prepared and issued for the convenience of other laboratories and workers.

The Institute continued to stock and issue prophylactic and curative sera for the use of the Army in India.

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* Annual Report of the Central Research Institute, Kasauli, including the Annual Report of the Malaria Survey of India for 1935. Manager of Publications, Delhi, Price Rs. 2-10-0 or 4*s*. 9*d*.

Abbreviations—

I. R. F. A.	Indian Research Fund Association.
I. J. M. R.	Indian Journal of Medical Research.
D. P. H.	Diploma in Public Health.
D. T. M.	Diploma in Tropical Medicine.
D. M. C. W.	Diploma in Maternity and Child Welfare.
L. T. M.	Licentiate in Tropical Medicine.
I. M. R. Memoirs	Indian Medical Research Memoirs.
M. R. Deptt.	Medical Research Department.

As Chairman of the Cholera Advisory Committee the Director submitted reports on the work of the various cholera enquiries for communication to the 1935 meetings of the Office International d' Hygiene Publique held in Paris. Sections on sera, vaccines, snake bites, etc., were also revised for new editions of standard books. Lt.-Col. W. J. Webster, I.M.S., prepared a new Health Bulletin entitled " A note on hydrocyanic acid gas fumigation of rat burrows as an anti-plague measure ".

Facilities were afforded to medical officers for the study of bacteriological technique, but no systematic courses of instruction were arranged. The Institute library was used by numerous workers, both civil and military.

Research Work.—With funds provided by the I. R. F. A., the following investigations were carried out by the Institute staff :—

(*a*) *Studies on cholera vibrios.*—This enquiry worked in association with other enquiries at Calcutta and Shillong, co-ordination being arranged by a Cholera Advisory Committee. The chief lines of investigation were :—

(*i*) *Changes in serological reactions of vibrios.*—The changes occurring during the serial passage of certain vibrio strains in white mice were investigated in regard to their serological reactions and in relation to their chemical structure as determined by Dr. Linton's enquiry in Calcutta. The strains were inagglutinable but in the course of serial passages forms were eventually obtained which showed full agglutination with cholera high-titre serum prepared with strains of the classical serological type.

(*ii*) *Serological types of vibrios.*—An extended inquiry into the serological types of vibrios obtained from cases of clinical cholera carriers and external sources was commenced. All vibrios isolated by associated inquiries were tested for agglutination at Calcutta where clinical material was readily available, whilst an " O " serum of the classical type and strains not agglutinating with that serum were received at Kasauli for further investigation. The biochemical and other characters of these strains were determined and their agglutination was tested with sera corresponding to Gardner and Venkatraman's " O " groups II to VI and also with sera prepared from selected Calcutta strains.

(*iii*) *Rough variations of vibrios.*—A large number of strains have been roughened by means of prolonged exposure to the action of homologous anti-sera or by action of bactericidal sera ; this study was in progress.

(*iv*) *Fermentation reactions of vibrios.*—Strains were studied in regard to their fermentation in mannose arabinose and saccharose and classified in accordance with Heiberg's scheme.

(*v*) *The value of dried " O " antigen for the production of agglutinating sera.*—Dried antigens prepared from the Inaba and Ogawa cholera strains were received from the National Institute for Medical Research, Hampstead, and the Standards Laboratory, Oxford, and were tested for their value in the preparation of agglutinating sera for use in the diagnosis of the cholera vibrio under practical conditions in India. The sera raised by means of the dried antigens have been found to be of great value in the examination of vibrios and have enabled strains possessing the " H " antigen of *V. Cholerae* only to be differentiated from those having the " O " fraction. Experience gained so far suggest that the issue of the dried antigens from the Standards Laboratory, Oxford, will enable reliable and comparative serological results to be obtained in any part of the world.

(*vi*) *Experimental observations on cholera vaccine.*—It has been found by experiments on animals that the cholera vaccine stored for a year, including

a full hot weather, in the plains of the Punjab gives protection equal to that obtained with freshly made vaccine. The expiry period has thus been extended to one year. Experiments as well as statistical evidence have indicated that the most effective immunity will be developed about the eighth day after inoculation.

The protection given in animals against infection with a typical cholera case strain by vaccine made from strains of different character and source of origin was tested.

(*b*) *Snake Venoms.*—The subjects studied included coagulant action of viper venoms on blood; preservation of coagulant solutions of daboia venom; pathology of *Echis carinata* venom poisoning and treatment with a heterologous anti-venine; chemical composition of daboia and cobra venoms and location of their active principles the enzymes of daboia and cobra venoms; the use of tapioca in immunisation of animals; and immunisation with venom fractions. Six papers embodying the results obtained were published in the I. J. M. R.

All-India Institute of Hygiene and Public Health, Calcutta.*

98. Lt.-Col. A. D. Stewart, I.M.S., the Director of the Institute proceeded on leave preparatory to retirement on 13th September, 1935, when Dr. R. B. Lal, the present officiating Director of the Institute, took charge. Lt.-Col. A. A. E. Baptist, the Assistant Director, retired in July and this post remained vacant until the end of the year. Dr. M. I. Neal-Edwards, W.M.S., was appointed Professor of Maternity and Child Welfare in succession to Dr. Jean M. Orkney, W.M.S.

In accordance with Section 7, Chapter XVIII of the Calcutta University Regulations, an Inspection Committee visited and reported on the Institute. As a result, the Institute was affiliated to the University of Calcutta for the Diploma in Public Health and for the Doctorate in Science (Public Health).

With the increased activities of the different departments, pressure on allotted accommodation was experienced and part of the quarters temporarily occupied by the Assistant Director was reconverted to provide additional laboratory accommodation. Although some further accommodation was made available by internal re-arrangements, the constantly growing needs of the various departments indicate that it will be increasingly difficult to house outside enquiries for any length of time.

The Library, which now contains 4,661 books, and that of the School of Tropical Medicine were open to the staff and students of both Institutions, most of the important journals and periodicals are available in one or other library.

During the year under review, 22 candidates joined the D.P.H. class of the Institute. Six post-graduate combined courses of three months' duration were provided in Biochemistry, Nutrition, Vital Statistics and Epidemiology, Malariology, Maternity and Child Welfare. A stipend of Rs. 50 per month was offered by the Indian Red Cross Society for a D. M. C. W. student and a scholarship of Rs. 30 for the same course was offered by Dr. Balfour. No student, however, joined this course during the year.

* Annual Report of the All-India Institute of Hygiene and Public Health, Calcutta 1935. Government of India Press, Calcutta.

As regards field instruction, the students received training in the routine and special duties of a medical officer of health under the Health Officer, Calcutta Corporation. Practical demonstrations were also given in and outside Calcutta. A malaria centre was established near Burdwan to provide facilities for field studies in rural malaria.

Department of Vital Statistics and Epidemiology.—This department was associated with the cholera carrier enquiry under the I. R. F. A. A preliminary statistical investigation of the figures for cholera mortality in Bengal during 1901—30 having revealed heterogeneity among the districts as regards mean and seasonal incidence of the disease it was decided to work with the figures of individual *thanas* which were the smallest areas for which figures were available. The whole of the Howrah District, Magrahat in the 24-Parganas and 5 villages in the Midnapore District were found to be endemic.

The field enquiry devoted much of its time to the problem of transmission of cholera, which included the question of the maintenance of infection during non-epidemic seasons.

Investigations on epidemic dropsy were continued; no final conclusion was reached.

Department of Malariology and Rural Hygiene.—The necessary extra staff was sanctioned partly by the I. R. F. A. and partly by the Government of India.

The mechanism of haemolysis in malarial haemoglobinuria of monkeys was investigated. Treatment of haemoglobinuria, electrical charge of red cells, cholesterol changes in kala-azar, the incidence of syphilis in the general population and the causes of an outbreak of acute miliary tuberculosis which occurred in laboratory monkeys at the Institute were also studied. With a view to evolving a cheap method of rural malaria control, malarial conditions obtaining in the villages of Naity and Abujhati were studied. From the records of larval catches, jute steeping appeared to be an important factor in reducing the prevalence of anopheles carriers. The value of local fish as larvæ destroyers was also recognised. Several papers were published during the year and assistance given to outside agencies.

Department of Biochemistry and Nutrition.—A survey of the calcium and phosphorus contents of all readily available food stuffs was completed. The vitamin A, carotene and vitamin C surveys were also completed. As regards carotene, all the '*sags*' (spinach types) were found to be exceptionally rich in this constituent and '*langra*' mango was found to be very rich in vitamin C. The biological assay of vitamins could not be completed during the year. A diet survey of families and institutions in Calcutta showed that the diet was reasonably well-balanced among the middle-class families, but the diets of a Moslem orphanage, a Hindu orphanage and an Anglo-Indian school were found to be poor and ill-balanced.

The investigation of the physique of school children of Calcutta was continued. In co-operation with the School of Tropical Medicine, some clinical and biochemical work was done in connection with epidemic dropsy. Absorption of carotene, metabolism of ascorbic acid and the aetiology of cataract were also studied during the year.

An apparatus to measure the oxidation reduction potential of cholera cultures was being prepared.

Maternity and Child Welfare Department.—There were no students for the 1935-36 course. As regards research activities, an enquiry was made

into the health and nutrition of women jute mill workers with special reference to the effect of industrial conditions on the reproductive functions and on the health of the children during the first year of life. Another investigation dealt with the medical causes of infantile mortality and its correlation with social, economic and environmental factors.

***School of Tropical Medicine, Calcutta.**

99. Bt.-Col. R. N. Chopra, I.M.S., officiated as Director during the year and Dr. R. T. M. Hayter continued as Assistant Director. Dr. E. Muir retired during the year.

The Rockefeller fellowship awarded in 1934 to Drs. B. Mukerjee, B. M. Das Gupta and D. N. Roy were extended, and an additional fellowship was awarded to Dr. C. R. Das Gupta. The Minto Medal for 1935 was awarded to Dr. J. P. Bose for his researches in diabetes.

The School continued to function as a centre for post-graduate teaching and medical research. Of the 41 students who took the D. T. M. Course 32 passed. 48 students appeared for the L.T.M. Examination, and 35 passed. 22 students attended the 1934-35 D.P.H. course, 20 passed both parts of the examination and were awarded the Diploma of Public Health.

Researches carried out during the year included those on epidemic dropsy under Col. Chopra, anæmia and respiratory diseases under Dr. Napiers hookworm under Dr. Maplestone, leprosy under Dr. Lowe, bowel diseasel under Dr. deMonte, diabetes under Dr. Bose, filariasis under Dr. Sundar Rao, epidemic cerebro-spinal meningitis and the so-called mystery disease "jhin jhina". The Carmichael Hospital for Tropical Diseases, attached to the School continued to function as a teaching and research hospital.

Departmental activities—(*a*) *Department of Tropical Medicine.*—As usual the teaching for the L.T.M. and D.T.M. courses and a study of hospital cases figured as the main functions of the Department. It was discovered that alkalis and antiseptics, though very effective in the treatment of urinary infections, cannot be relied on in the treatment of sub-acute and chronic cases.

(*b*) *Department of Bacteriology, Pathology and Helminthology.*—The important results yielded by the study of 488 sera for the presence of agglutinins justified continuation of this work. Routine examinations included 4,710 specimens of stools and 488 samples of blood. Several labour-saving devices were introduced in the media section of the Department and the necessity for installing a central superheated steam sterilization plant was emphasised.

Work in connection with the three cholera inquiries financed by the I. R. F. A. was continued. One to two per cent of vibrio-passers were found amongst the healthy population of Calcutta. Unlike last year, choleraphage was shown to be of value in the treatment of cholera, the mortality rate among patients treated with choleraphage being 13·5%, that among patients not so treated being 16·6%. A new type of choleraphage designated 'Type M' was isolated and a standard cholera vibrio used for the propagation of choleraphage was found to be itself carrying vibriophage. Other questions studied were cholera toxin, the seasonal variation of vibrios, and the basic bacteriology of vibrios.

* Annual Report of the Calcutta School of Tropical Medicine and the Carmichael Hospital for Tropical Diseases for 1935, Superintendent, Government Printing, Bengal Government Press, Alipore, Bengal, 1936. (Gratis).

Following investigation of the diarrhœa and dysentery out-breaks in Darjeeling, the main conclusion was that the intestinal fluxes were bacterial infections due to a large variety of bacteria and that climatic factors were not solely responsible. Other work done in the department included the study of epidemic dropsy, epidemic cerebro-spinal meningitis, bacteriophagic analysis of *Past*: *pestis* strains in collaboration with Col. Sokhey and *B. pseudo-carolinus*.

(*c*) *Department of Protozoology.*—Altogether 6,853 routine examinations were performed, the majority being chronic amoebic dysentery, malaria and rat-bite fever. 25 out of the 40 cases of chronic intestinal amoe biasis were cured by amibiarson. Positive cases of rat-bite fever were treated with N. A. B. or solusalvarsan with cent per cent success.

The malaria transmission enquiry under the auspices of the I. R. F. A. was continued throughout the year. For details the annual report of the school should be consulted, but it may be stated that the results obtained appear to confirm the view that quartan malaria in India is a cold-weather disease. Problems associated with monkey malaria, *plasmodium ovale* and immunity and electrical charge on erythrocytes were also studied.

(*d*) *Department of Entomology.*—The Calcutta anopheline survey was concluded and its report on the effects of physical conditions on the prevalence, longevity and avidity of anophelines was sent for publication. Observations were also made on the bionomics of anophelines. The work of the Bengal Delta Survey begun last year made good progress ; the malaria survey of tea gardens was continued.

(*e*) *Department of Pharmacology.*—Chemotherapeutic studies with anti-malarial and anti-dysenteric drugs gave results of practical importance. It was shown that there was no direct relationship between concentration of quinine in the blood and the parasite count at any particular time and that the action of quinine on the parasite did not appear to be a direct one. A method of quantitatively estimating atebrin in the blood was devised and a method of estimating the distribution of atebrin in the body was being worked out. Studies on the action of snake venoms were continued and the claims regarding their therapeutic effects in relieving pain, in inoperable carcinoma, insanity, purpura, epilepsy, neuritis, hæmorrhagic diseases, etc., were being investigated.

A large amount of work was also done in connection with the physical and chemical changes produced in the blood by diseases and interesting results were obtained. Work was also done in connection with the alteration of the electrical charge of the blood cells after administration of drugs like quinine and emetine. Several indigenous drugs of vegetable origin and a number of inorganic preparations used as indigenous medicines were investigated.

The Drug Addiction Enquiry made investigations into the habitual use of barbituric-acid derivatives in India and the results of the work on the physical and mental effects produced by the opium habit were published. Experiments made with lecithin in the treatment of opium addicts were very successful.

(*f*) *Department of Chemistry and Physics.*—A number of indigenous drugs including *Hemidesmus indicus*, *Barringtonia acutangula*, *Tylophora asthmatica*, *Secuma lauralia*, *Vitex negundoo*, and *Silvia moorcroftiana* were analysed ; and a number of inorganic preparations including *Praupya bhasma* and *Samudra phena* were also examined. Biochemical work in connection with the

enzymes of cholera vibrios was continued. The proteolytic enzyme activity of different varieties of Indian *Ficus* trees was under investigation.

(*g*) *Serological and Immunological Department.*—In addition to medico-legal work, 13,473 Wassermann reactions were tested and blood grouping tests numbered 261. A serological study in rabies was commenced and good progress was made in the study of the distribution of blood groups in the Indian Army and in the study of antigens used in the Wassermann reaction.

(*h*) *Department of Hygiene.*—An enquiry into the existence of *B. typhosus* in raw Hooghly water was launched and the Cholera Enquiry in its various branches was continued throughout the year. 32 samples obtained from diphtheria cases were examined with a view to comparing the distribution in this country of McLeod's three types of *C. diphtheriae* with that in other countries.

(*i*) *Department of Public Health Laboratory Practice.*—The efficacy of chloramine in sterilizing tap water inoculated with *B. typhosus* was studied. The viscosity value of mustard oil, changes in the constants of ghee as a result of boiling and the effect of boiling in a particular type of vessel on the fat contents of milk were also examined.

The kala-azar enquiry financed by the I. R. F. A. was continued under Dr. Napier on a reduced scale. Some work was done on the bionomics of *Phlebotomus argentipes* and the transmission of *L. donovani* by the use of wild *P. argentipes*. Investigations into the probable causes of failure in transmission experiments were commenced.

A summary of the various researches carried out under the auspices of the Endowment Fund is given below:—

Anæmias and Respiratory diseases.—It was found that the vast majority of anæmias met within tea gardens were due to "conditioned" iron deficiency. All patients, excepting 3 suffering from hypocromic microcytic anæmia, responded well to iron treatment. Hookworm infection was noticed in all cases; its presence did not appear to affect blood regeneration when sufficient iron was given, though the improvment could not be maintained without expelling hookworms.

An examination of the different methods of measuring red cells led to the conclusion that the packed-cell method of estimating cell volume was both simple and accurate.

No regular work in the typing of pneumococci could be done during the year. 36 strains were isolated from the cerebro-spinal fluid and it was found that a cool-room temperature was more favourable for storing grown cultures of meningococci than the incubator temperature. Points of special interest in the investigation of asthma cases were (*i*) the testing of the pilocarpine response, (*ii*) the occurrence of three cases of asthma definitely sensitive to dust, and (*iii*) a study of the change in the Arneth count after a course of treatment with auto-vaccine, etc.

Hookworm.—Tetrachloretheylene was found to be a cheap and effective remedy in the treatment of hookworm.

It was also tried with success against tapeworm infections where it was thought inadvisable to give carbon tetrachloride. Work on hookworm anæmia was continued and experiments were conducted on the hookworm preventive value of bore-hole latrines. The problem of *Taenia solium* in man in India was investigated. The possibility of the use of fresh juice from Indian *Ficus* in the treatment of trichuris (whipworm) was also explored.

Leprosy.—Leprolin treatment caused distinct improvement in the lesions and, whilst signs of the activity of the disease often disappeared within a comparatively short time, later results proved to be unsatisfactory. Treatment with hydnocarpus oil or Esters brought about slow but steady improvement and arrested the progress of the disease in some cases. Rat leprosy was thoroughly studied.

Attempts to culture *M. leprae* and. *M. leprae muirs* were continued by tissue culture methods. Rat tissues *in vitro* were successfully cultured and infected with *M. leprae muirs,* but there was no definite proof of the multiplication of the bacilli.

Bowel diseases.—The efficacy of cholera, dysentery and typhoid phages in the treatment of the bowel diseases was studied and a large amount of material from Diamond Harbour was tested for the presence of phages active against cholera, typhoid, flexner and shiga organisms. Experiments to determine the effect of freezing and drying cholera and dysentery phages were in progress.

Diabetes.—Arterio-venous sugar differences especially after a glucose meal were studied in cases of diabetes, in order to determine the severity of the disease. It was observed that, in adjudging the results of glucose tolerance tests ; both the height to which the blood sugar curve rises as well as the time taken by it to return to normal should be taken into consideration as a criterion of the nature and severity of the disease.

Statistics regarding the mortality rate of diabetics among various races in India were being collected and work on the estimation of the total cholesterol content of blood in diabetic subjects was continued.

Filariasis.—It was found that temperature and humidity play a very important part in the transmission of filariasis in man by *Culex fatigans,* that the monsoon period in Calcutta was the time at which the maximum infection of fed mosquitoes occurred ; and that the cold weather was very unfavourable for the development of micro-filariae in mosquitoes.

19 papers were published in the I. J. M. R., 30 in the Indian Medical Gazette ; and 14 in other journals.

Haffkine Institute, Bombay.

100. Lt.-Col. S. S. Sokhey, I.M.S., was Director except from 23rd July to 20th November, 1935, when Major R. C. Wats officiated. Major R. C. Wats, I.M.S., Dr. M. B. Soparkar and Dr. P. M. Wagle acted as Assistant Directors. Captain J. R. Dogra, I.M.S., and Dr. B. B. Dikshit were supernumerary officers.

The Institute continued to manufacture anti-plague vaccine and to carry out various researches. A total of 3,051,132 c. cs. of plague vaccine were issued. The pharmacological department which was closed down in 1933 was reopened and studies of synthetic anti-malarials commenced. Work on nutrition was also started. The Institute continued to hold classes for training medical officers of health and sanitary inspectors of the Presidency and neighbouring States.

Towards the end of the year a Plague Statistical Enquiry was started, but had to be abandoned later due to the unwillingness of the people to undergo plague inoculation during the harvest season.

Anti-rabic Section.—For details please see Pasteur Institute, Bombay, (page 142).

Rat Examination.—The examination of rats for plague infection was continued. None of the rats examined within the last 18 months have been found infected.

Snakes and Snake Venom.—152 Cobras and 185 Russell's vipers were received and 348 grammes of venom from the former and 51·2 from the latter were prepared for use.

Diagnostic Department.—In addition to cultural examinations of blood, stools and urine, 4,000 routine Wassermann tests were done, 430 pathological specimens sectioned and examined and numerous histological examinations were made for research purposes.

Research Work.—Plague Vaccine.—Work in connection with the maintenance of virulence of *B. pestis* cultures was continued. During the third year of storage at 4°C.±2, cultures were found to be fully virulent. It was found that plague cultures could be rendered avirulent by repeated subcultures at 37°C. without destroying their antigenic value, thus making it possible to have the same strains of plague in both fully virulent form and avirulent form at the same time. An investigation of the relative values of vaccines made from living avirulent cultures and heat-killed cultures was started; the effect of temperature at which cultures are killed on the protective power of the resultant vaccine was also being studied.

Anti-plague Serum.—Buffalo serum was found to prolong the life of treated animals only temporarily, Horses' serum, however, saved 70—80% of the mice treated.

Serology of plague.—The substitution of serological for the biological methods hitherto employed to measure the protective and therapeutic values of sera was considered desirable, as the latter required a large number of mice and about one month for each test.

Epidemiology of plague.—An investigation into the relative susceptibility of rats to plague from different areas in India, which had had epidemic plague in varying degrees, showed that the immunity of rats was roughly proportional to the aggregate incidence of plague in those areas.

King Institute of Preventive Medicine, Madras.*

101. Dr. C. G. Pandit officiated as Director until 17th December 1934, Lt.-Colonel H. E. Shortt, I.M.S., for the rest of the year.

Vaccine lymph.—During the year 23,987 grammes of crude lymph were manufactured representing 143,924 c.cs. of diluted lymph for issue. All lymph was issued in a dilution of 1 in 7 and was treated with clove oil immediately before issue.

Bacterial vaccines.—25,107 doses of T. A. B. vaccine and 2,182,160 of cholera vaccine were issued, the latter figure being a record. The issues of various therapeutic vaccines rose to 51,761 doses, the increase being chiefly in the gonococcus vaccine, streptococcus (filarial) vaccine and mixed dysentery vaccines. The total issue of cholera bacteriophage was 181,620 c.cs. and of dysentery phage 7,218 c.cs. There was an increase of about 50% in the supply of various sera.

Bacteriological, serological and chemical examinations.—Altogether 67,371 examinations were carried out. Of the bacteriological examinations, 1,813 specimens were examined for cholera; of these 815 proved positive.

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* Report of the King Institute of Preventive Medicine, Guindy, for the year ending 30th September 1935, Superintendent, Government Press, Madras, Price *annas 8*.

Research work.—The more important activities are summarised below but for detailed information the original report of the Director should be consulted.

(*a*) *Vaccine Lymph.*—Work on the cultivation of vaccinia virus in the choreo-allantoic membrane of the chick-embryo was continued. The strain has now had 82 serial passages in eggs. With improved technique, the potency of the cultured virus in the later passages has increased considerably. Its immunising properties have been found to be equal to those obtained with routine calf-lymph and its keeping qualities are not unsatisfactory. Field experiments with this cultured virus and the routine calf lymph have so far yielded comparable results.

Immunising and storage qualities of the bacteria-free suspensions of vaccinia virus as obtained from crude calf lymph by simple filteration through Berkefield " V " filter and by the technique of elution with casein-alumina-gel were being studied in different substances such as broth, glycerine water, semi-solid agar, etc., as were also the immunological properties of active, attenuated and inactive virus.

The virus of varicella has been successfully cultivated on the chorio-allantoic membrane; experiments designed to cultivate the viruses of dengue and sandfly fever and the probable viruses of trachoma and superficial punctate keratitis were in progress. The manufacture of gradacol membranes according to Dr. Elford's technique was undertaken as a useful adjunct in the study of filterable viruses.

An improved method by freezing the lymph preliminary to drying was adopted and two samples of dried lymph so treated were tested after two months' storage in vaccumised tubes at room temperature. These were found inactive on calves in 1-1000 dilution but active in 1-5, whereas the control dried lymph stored in the cold gave almost confluent vesiculation in 1-1000.

Lymph prepared by substituting humanised lymph for rabbit lymph in the seed cycle gave as good results as the routine lymph. Four strains of staphylococci of albus and aureus types isolated from vaccine lymph, all non-haemolytic, were tested for pathogenicity and toxicity.

Experiments were continued to ascertain whether anti-vaccinial response in sheep was better than that in cow calves or buffalo calves. The protective power of the concentrated anti-vaccine serum prepared from sheep was tested on vaccinated rabbits and it was found to have no effect on the development of the vaccinal lesions.

Animal experiments were being conducted to evaluate the duration of immunity to revaccination with the strains of vaccinia virus raised from variola virus by several passages through monkeys as compared with that obtained after vaccination with the routine lymph now in use.

Other studies were made in connection with (*i*) Demodex infection in calves ; (*ii*) a modified Klines' test for the diagnosis of syphilis ; and (*iii*) the viability of the " infective " forms of the larvæ of *Wuchereria bancrofti* when freed from the mosquito host. In addition, many other public health problems in connection with water, Kala-azar, monkey malaria, trachoma, etc., were studied. Sixteen papers embodying the results of these researches were published in the I. J. M. R. and other Indian and foreign journals.

Pasteur Institute of India, Kasauli.

102. Lt.-Col. G. Covell, I.M.S., was Director throughout the year.

During the year 21,898 patients sought treatment at the Institute and its ancillary centres. Of these 16,627, including 1,473 Europeans

underwent a complete course; 3,027 persons abandoned treatment; whilst 2,136 persons discontinued treatment either because the biting animal was not proved rabid or because it was not considered necessary.

Table VIII(*ii*) gives the death rates amongst Asiatics treated at Kasauli and its centres according to the position of wounds:—

TABLE VIII (*ii*).

Position of wounds.	Kasauli.			Centres.		
	Treated.	Deaths.	Rate %	Treated.	Deaths.	Rate %
Leg	442	1	0·2	8,087	24	0·3
Trunk	32	..	..	426	2	0·5
Arm	207	..	..	4,065	24	0·6
Multiple	80	..	..	915	14	1·5
Face	53	2	3·8	525	14	2·7
Multiple face	42	1	2·4	276	4	1·5

Table VIII(*iii*) gives figures arranged according to lateness of arrival expressed in days for Asiatics treated at the Institute and its centres:—

TABLE VIII(*iii*).

	Kasauli.			Centres.		
	Treated.	Deaths.	Rate %	Treated.	Deaths.	Rate %
1—7 days	732	1	0·1	11,451	59	0·5
8—14 days	82	2	2·4	1,717	11	0·6
15—21 days	26	1	3·9	531	4	0·8
22—28 days	7	..	..	113	1	0·9
Over 28 days	10	..	..	485	7	1·4

No death from hydrophobia occurred amongst Europeans. The dog was responsible for bites in 12,712 cases with 62 deaths; the jackal in 1,607 with 22 deaths; and other animals in 835 with only 2 deaths. Carbolised 5% Paris Sheep Vaccine was used both at the Institute and its centres, and dosage and duration of treatment remained unchanged. Complaints attributed to anti-rabic treatment were received from 287 patients, but as usual most of these bore no causal relationship to the treatment. Four paralytic cases including 2 Europeans were reported; one European died and the others recovered. Of the 149 brains examined 85 were found positive.

Details of the work of the various Pasteur Institutes mentioned will be found in the following publications:—

(1) Pasteur Institute of India, Kasauli—35th Annual Report of Central Committee of the Association and the Report of the Director of the Institute for 1935-36.

(2) Pasteur Institute of Southern India, Coonoor—The Annual Report of the Director for 1935 together with the 29th Annual Report of the Central Committee of the Association for 1935-36.

(3) King Edward VII Memorial Pasteur Institute and Medical Research Institute, Shillong—The 19th Annual Report for 1935, Assam Government Press, Shillong. (Rs. 1-10-0 or 2*s*. 6*d*. per copy).

(4) Pasteur Institute, Bombay.—Report of the Haffkine Institute for the years 1932-33. The Govt. Central Press, Bombay. Price Annas 12 or 1*s*. 3*d*. per copy

(5) Report on the working of the Burma Pasteur Institute and Bacteriological Laboratory, Rangoon, for 1935, Superintendent, Govt. Printing and Stationery, Burma, Rangoon. (Rs. 1-4-0 or 1*s*. 11*d*. per copy.)

(6) Annual Report of the Pasteur Institute, Patna, and of the Anti-rabic Centre, Cuttack, for 1935. Superintendent, Govt. Printing, Bihar, Patna. Price Rs. 2-12-0 per copy.

Research Work.—This included experiments (*a*) on the post-infectional immunizing value of immune serum as an adjunct to vaccine treatment, (*b*) involving the use of live fixed virus in conjunction with anti-rabic serum as an adjunct to dead virus treatment, (*c*) in connection with the antigenic properties of carbolized 5% vaccine, (*d*) with a rabies virus fixed in the dog for the treatment of animals, and (*e*) in connection with the viricidal properties of phenol.

Pasteur Institute of Southern India, Coonoor.

103. Major K. R. K. Iyengar was Director throughout the year.

In all 535 patients applied for treatment at the Institute, of whom 433 including 18 Europeans underwent the full course, 44 discontinued treatment presumably not being at risk and 58 were advised to discontinue as the biting animal was not rabid. Advice cases numbered 198. In 30 cases the biting animal was proved to be rabid; in 3 it was certified rabid; in 213 it was probably rabid according to history; and in 187 cases the history of the biting animal was unknown. There were no deaths from hydrophobia. Semple's carbolised 5% sheep vaccine was used throughout without any post-treatment complications. 1,205,320 c.cs. of anti-rabic vaccine was manufactured during the year. 8,120 c.cs. of 1% vaccine and 16,184 c.cs. of 5% vaccine were issued to veterinary surgeons, although only 351 animals including 314 dogs were treated. Of the 342 brains examined 248 proved positive. The number of clinical and bacteriological examinations performed during the year rose to 2,611.

Out-centres.—Treatment was the same as at the Institute. 12,282 patients including 336 Europeans received the complete course, and among these 14 deaths occurred, all Asiatics. Those incompletely treated numbered 2,248, including 42 Europeans; of these 6 Asiatics died and 1,898 were presumed to be at risk. Two deaths occurred from jackal-bite and 18 from dog-bite. The total death rate was 0·16%, the lowest on record; that among the completely treated 0·11% and that among the incompletely treated 0·26%. Out of the 6 deaths among the incompletely treated five developed hydrophobia during the treatment course and one case occurred among those who had run off during treatment. The shortest incubation period was 13 days and the longest 231 days, both cases being dog-bites.

Research Work.—10 scientific papers embodying the results of investigations carried out at the Institute were published in the "I. J. M. R."

King Edward VII Memorial Pasteur Institute, Shillong.

104. Lt.-Col. L. A. P. Anderson was Director of the Institute except for the period 21st March to 21st Nov. 1935, when Dr. C. G. Pandit officiated.

Anti-rabic treatment.—Classification of the cases and dosage remained unchanged. 1,948 patients in all applied for treatment at the Institute and 21 public and 39 private centres and no post-treatment accidents were reported. Of the total, 1,550 cases, including 42 Europeans, were completely treated, 172 at the Institute and 1,378 at the centres; 4 underwent partial treatment; and 200 absconded before completion of the course. Advice cases numbered 194. The number of deaths was 11, all amongst Asiatics; 10 among dog-bite and 1 among jackal-bite cases. The increase in the death rate from 0·43% to 0·73% was due to the inclusion, for the first time, of non-failures or other forms of reduced mortality.

In 52 cases with one death treated at the Institute the biting animal was rabid; in 5 cases it was certified rabid; in 108 cases it was probably rabid according to history; and in 8 cases the history of the biting animal was unknown. Figures for centres are not available. Of 57 brains examined, 35 proved to be positive.

Vaccines.—During the year 475,955 c.cs. of cholera vaccine, 7,559 c.cs. of T. A. B. vaccine and 15,500 c.cs. of influenza vaccine were issued in addition to 1,020,481 doses of bacteriophage.

Research Work.—Field experiments on the prevention and treatment of cholera under village conditions by the extensive distribution of bacteriophage were continued in the two control areas of Nowgong and Habiganj, but no definite conclusions either for or against the value of bacteriophage were arrived at. Basic research was carried out on (*i*) the duration of potency of cholera bacteriophage; (*ii*) the study of changes produced in *V. Cholerae* strain 653 by the action of single type choleraphage; (*iii*) the changes produced in a typical *V. Cholerae* strain by the combined action of 10 and 11 types of choleraphage; and (*iv*) the inhibition of individual types of cholera bacteriophage by vibrio extracts.

Burma Pasteur Institute and Bacteriological Laboratory, Rangoon.

105. Major G. C. Maitra, I.M.S., acted as Director of the Institute and Bacteriologist to the Govt. of Burma. Of the 3,341 patients who applied for anti rabic treatment, 2,014 comprising 232 Europeans and Anglo-Indians, 335 Burmans and 1,447 others underwent the full course (1,568 at the Institute and 446 at out-centres and hospitals). 442 did not complete the course and 457 stopped treatment as the biting animal was not rabid. Advice cases at the Institute numbered 961. Health cards were received from 93% of the cases treated at and from 79% of the cases treated outside the Institute. One fatal paralytic case occurred during the year. Three cases developed hydrophobia during treatment or just after completion of the course. The death rate at the Institute was 0·19% the lowest on record since 1920; no deaths occurred at out-centres.

Of the 44 animals under observation for rabies 26 died, 22 showing evidence of rabies on microscopic examination. Six human and 94 animal brains were also examined and 5 and 53 respectively proved positive. In all, 175,086 c.cs. of the anti-rabic vaccine were manufactured and 7,263 doses issued to out-centres.

Bacteriological Section.—A total of 25,122 examinations, including 20,167 serological, 3,409 microscopical, 875 cultural, 466 chemical and biochemical, 138 histological and 67 miscellaneous examinations were carried out. Cultural examinations included the isolation of several strains of cholera vibrio and organisms of epidemic meningitis. The cultures of cholera vibrio were preserved for further study. The issue of various vaccines and sera, apparatus and reagents all increased during the year. A total of 33,990 c.cs. of prophylactic T. A. B. vaccine was issued.

Research Work.—This included observations on the leptospiral infestation of rats and a systematic survey to elucidate the distribution and prevalence of tropical typhus fevers in Burma.

Pasteur Institute, Calcutta.

106. This Institute is a part of the School of Tropical Medicine, Calcutta.

Of the 2,654 patients who attended the Institute, 833 including 79 Europeans had a complete course of treatment; 498 including 11 Europeans were referred to other hospitals and centres; 127 voluntarily discontinued treatment; and 1,196 were advice cases. The percentage of health returns received was 62 for the Institute and 15 for the centres. Excluding 9 cases, which arrived with definite symptoms of hydrophobia, deaths numbered 29; three (including one European) at the Institute and 26 at the Centres. Of the latter 10 were considered as "failures" as they occurred 15 days after the completion of the treatment. The total death rate was 0·6%; 0·4% for the Institute and 0·6% for the centres.

Semple's carbolised 1% vaccine made from sheep's brain with the Paris strain of fixed virus continued to be used and treatment remained unchanged, *viz.*, 5 c.cs. daily for 7 days for licks and 14 days for bites. A total of 467,780 c.cs. of vaccine was manufactured. No case of post-treatment paralysis was reported. Eighteen Medical Officers were trained in the technique of anti-rabic treatment.

Pasteur Institute, Bombay.

107. This Institute, which is a part of the Haffkine Institute, was attended by 2,953 patients. Of these 2,272, including 70 Europeans, underwent the complete course, 24 discontinued treatment and 657 were only advice cases. Most of the patients had bites on the bare trunk and the extremities. Health returns from 96·7% of the cases treated were received. One death from hydrophobia occurred within, and three deaths over, 15 days after completion of treatment, giving a total mortality rate of 0·17 %. In the case of 137 patients (with one death) the biting animal was proved to be rabid, in 24 it was certified so, in 241 (with 3 deaths) it was probably rabid and in 1,870 the history was unknown. The dog was the biting animal in 2,190 cases (4 deaths), jackal in 19, cat in 23, monkey in 16, human being and horse in 6 each. In the other 12 cases, no particulars were available. Of the 213 animal brains examined 170 were found positive.

Out-centres.—5,850 patients, including 306 Europeans, received a full course of treatment and 51 were advice cases only. 3 patients died of hydrophobia during treatment, 15 within 15 days and 17 over 15 days after completion of treatment, giving a total mortality rate of 0·54 %. Health returns from 81% of the cases treated were received. Sixteen deaths occurred amongst those bitten on the face and an equal number amongst those with bites on trunk and extremities including 30 on bare skin. In the case of 137 patients, with one death, the biting animal was proved rabid; in 144, with no death, it was certified so; in 4,182 with 30 deaths, it was probably rabid; and in 1,379 cases, with one death, the history of the biting animal was unknown. No patient developed paralysis after treatment either at the Institute or at the centres. 255 anti-rabic treatments were issued to veterinary surgeons complete for treatment of dogs and other animals.

Pasteur Institute, Patna.

108. A total of 3,920 patients, including 32 Europeans, underwent the complete course; 706 including 3 Europeans absconded whilst 285 including

5 Europeans were advice cases. Five cases arrived with definite symptoms of hydrophobia, 9 developed hydrophobia during treatment and 5 died of other causes during treatment ; one case refused to undergo any treatment. The 23 deaths from hydrophobia, which gave a death rate of 0·6%, all occurred among Asiatics. In 31 cases, the animal was proved rabid, in 31 it was certified so, in 1,788 it was probably rabid, in 2,052 cases the history of the biting animal was unknown and in 18 cases the animal was probably not rabid. The interval between the bite and death in these 23 cases varied between 21 and 92 days. 13 deaths (57%) followed a jackal-bite and 10 (43%) were dog-bite cases.

25,962 c.cs. of 2% vaccine were issued to the Cuttack Centre, where 318 patients including 11 Europeans completed the treatment, 52 absconded and 6 including one European were advice cases. Three Asiatics died of hydrophobia due to jackal-bite, the death rate being nearly 1% and the interval between bite and death varying between 24 and 91 days. In 2 cases the animal was proved rabid, in 301 it was probably rabid and in 15 cases the animal was probably not rabid. Of the 32 brains examined 16 proved positive. Health returns were received from 66% of Europeans and 84% of Asiatics at the Institute and from 27% of Europeans and 78% of Asiatics at the Cuttack centre. Paris sheep virus was used throughout the year. At the Institute, all cases, except Classes III and IV who were treated with 5% carbolised vaccine only, were treated with 2% and 5% vaccines ; at the centre all cases were treated with 2% carbolised vaccine only. Treatment lasted for 14 days except for lick cases which took only 7 days. 24 cases were treated by civil surgeons while vaccine for 23 domestic animals was supplied on payment. 6,000 c.cs. of 2% carbolised vaccine were issued to Nepal.

Medico-Legal Work.

109. The following table summarises the medico-legal work done in those provinces which employ a chemical examiner :—

	Cases investigated.	Cases detected.	Samples examined.
British India	**11,960**	**7,789**	**37,070**
N. W. F. P.	475	384	1,176
Punjab	2,430	1,981	8,559
U. P. and C. P. . . .	1,629	1,215	4,489
Bengal	2,470	1,380	5,406
Bombay	1,263	827	5,343
Madras	1,558	1,180	8,268
Burma	2,135	822	3,829

N. W. F. P.—490 cases comprising 1,219 exhibits were examined, the increase being chiefly in blood-stain cases numbering 361. A positive result was obtained in 64·6% of human poisoning cases and 47% of cattle poisoning cases, in 87% of murder, etc. and 88% of sexual crimes. Of the 43 articles analysed for Government departments 15 were cocaine and its adulterants, 13 liquor, 9 *lahan* and one opium.

Punjab.—A total of 3,649 cases comprising 11,192 articles were examined, the increase being chiefly in stain cases. Of the 1,000 human and 35 animal poisoning cases investigated, 552 and 32 respectively were fatal. The

percentage of positive results in human poisoning cases was 69, in cattle poisoning cases 63, in blood stain cases 10 and in sexual offences 88. As usual, the poisons most commonly used in human cases were opium 49%, arsenic 19%, *dhatura* 12%, alchohol 7% and mercury salts 2%. Arsenic was found in 13 fatal animal poisoning cases. Other examinations included 88 samples of various drugs.

U. P. and C. P.—Cases of human and animal poisoning investigated numbered 414 and 15, the total number of medico-legal cases received being 1,629 comprising 4,489 exhibits. Analyses numbered 2,015 and stain cases 1,161. Arsenic, opium and *dhatura* were the commonest poisons.

Bengal.—Of the 2,470 medico-legal cases investigated, positive results were obtained in 1,380 or 56%. Medico-legal articles examined numbered 6,158 including 752 samples of preservatives. Poison was detected in 271 of the human and in 42 of the animal poisoning cases. Alcohol, arsenic, oleander, hydrocyanic acid and its salts, aconite and copper sulphate were observed in this order of frequency in human poisoning cases.

Bombay.—In all 5,434 medico-legal examinations were carried out and 1,263 cases investigated, including 648 of suspected human poisoning, 522 stain cases, 46 suspected animal poisoning and 47 miscellaneous. Other examinations included, 3,637 samples from the excise department, 486 from Government Stores and 263 miscellaneous. Poison was detected in 288 of the human cases, opium in 144, *dhatura* in 54, arsenic in 20 and other poisons in 70 cases. Deaths numbered 109. Poison was detected in 24 animal cases, yellow oleander (*Cerebra thevetia*) in 10, arsenic in 11 and strychnine in 3. Miscellaneous examinations included, *inter alia*, 634 samples of chemicals and medicines.

Madras.—Cases numbered 1,692 comprising 8,402 articles, and included 380 of human poisoning, 18 of animal poisoning, 1,073 stains and 87 miscellaneous. Poison was detected in 198 human cases or 52% of the total. Oleander, opium or its alkaloids and *dhatura* were the commonest poisons detected. Of the animal cases, 10 or 56% were positive, the common animal poisons being oleander (5 cases) and arsenic (5 cases).

Burma.—The number of examinations performed in the laboratory fell to 8,414, whilst the number of medico-legal cases rose to 2,135. Of the 650 cases of suspected human poisoning investigated, poison was detected in 286 cases, the most common poisons being opium, arsenic, oxalic acid and *dhatura*.

THE INDIAN RESEARCH FUND ASSOCIATION*.

General.

110. The following is a brief summary of the investigations financed by, and carried out under the auspices of the Association during 1935. Full details will be found in the report of the Scientific Advisory Board, in the papers published in the I. J. M. R., in its Memoirs and in the Records of the Malaria Survey of India, the Indian Medical Gazette and other journals. A detailed list is given in the appendix to this section (page 248).

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* Report of the Scientific Advisory Board of the Indian Research Fund Association, for the year 1935. Price Re. 1, obtainable from the Secretary, Governing Body, Indian Research Fund Association, New Delhi/Simla.

Cholera.

111. (*i*) *Cholera enquiry* (*Dr. R. W. Linton*).—Beginning in 1931 as a study of vibrio carbohydrates, the work of the enquiry has expanded year by year, and has now covered a wide range of phenomena dealing with the bacteriology of cholera. It is difficult to give any brief account of the different lines of activity or of the findings of this important enquiry. For details original papers should be consulted.

(*ii*) *Cholera carrier enquiry and cholera toxin enquiry* (*Captain C. L. Pasricha*).—These were concerned with (*i*) the bacteriological examination of specimens collected in the field, including stools from healthy persons, from suspected cholera cases, tank water from villages and experimental washings from known infected persons; (*ii*) the isolation of strains and their examination for smoothness or roughness, nitroso-indol reaction, type of growth agglutinability, etc.; (*iii*) bacteriophage studies, which included a careful periodic survey of the frequency and type of choleraphages in the controlled experimental area in Diamond Harbour, the isolation of a new type of choleraphage designated type M, the relationship of vibriophages to cholera vibrio, and phage analysis of strains from Diamond Harbour.

(*iii*) *Cholera clinical enquiry* (*Captain C. L. Pasricha*).—Experiments were carried out with a view to ascertaining the value of choleraphage in the treatment of cholera. Captain Pasricha reports—

"Taking the gross mortality in the two series, one treated in the usual manner and one in which choleraphage was administered in addition, and *irrespective of the exact nature of the case and irrespective of the cause of death*, the evidence is in favour of the use of choleraphage." Other work carried out was on the seasonal variation of vibrios, basic bacteriological studies of vibrios and bacteriophagic studies of certain select-fatal and non-fatal cases.

(*iv*) *Cholera carrier and epidemiological enquiries* (*Field Section*) (*Dr. R. B. Lal*).—This enquiry was carried out in a highly endemic zone in Bengal comprising 16 villages in Diamond Harbour *thana* in 24-Parganas district. The series of examinations made suggested that the carrier state amongst healthy individuals is of fairly long duration and that both its frequency and duration are in some way associated with the prevalence of cholera in the community. It was also indicated that the ultimate source of infection was the carrier whether infection was transmitted direct or through the medium of flies or tanks.

(*v*) *Statistical enquiry into the epidemiology of cholera in Bengal* (*Dr. R. B. Lal*).—The incidence of cholera exhibits a seasonal variation as well as a variation from year to year. The total variation of cholera incidence for a *thana* for the period 1901-32 was divided into 3 parts, *viz.*, (1) seasonal or between months, (2) cyclical or between years, and (3) residual variability. The calculations involved prevented the completion of the work during the year. Methods of forecasting epidemics of cholera were also being studied.

(*vi*) *Enquiry into the cholera vibrios and related vibrios under the Director, Central Research Institute, Kasauli.*—This enquiry mainly dealt with the material obtained from the Clinical and Carrier enquiries at Calcutta. A detailed serological study was made of vibrio strains which had been examined in regard to their chemical structure and other characters by associated workers. The studies made included:—(*a*) The antigenic relationships of vibrios from cholera cases, carriers, and external sources; (*b*) Serological reaction of variants whether occurring naturally or derived by methods of laboratory

treatment; (*c*) Serological and bio-chemical reactions of vibrios in relation to chemical structure as ascertained by associated enquiries; (*d*) The value of 'O' agglutination in diagnosis and the use of pure 'O' sera; (*e*) The production of high titre sera by the use of dried 'O' antigen and trials of the value of such sera; (*f*) The serological relationships of vibrios through their rough derivatives; and (*g*) The serological relationships of inagglutinable strains from cholera cases.

(*vii*) *Cholera Bacteriophage enquiry by the Director, Pasteur Institute, Shillong.*—Judged on this year's findings, bacteriophage did not yield as striking results as former reports had suggested. At the same time, it is stated that if the cholera mortality statistics for the prevaccination period, the vaccination period and the phage treatment period are compared, the first shows a high degree of mortality, the second a moderate and the third a low mortality. These reductions of course cannot be attributed solely to the use of vaccine alone or vaccine and phage.

Malaria.

112. (A). *Malaria Survey of India.*—(*a*) *General.*—Lt.-Col. J. A. Sinton, V.C., O.B.E., I.M.S., was Director and Major H. W. Mulligan, Assistant Director; Dr. E. P. Hicks was research worker; Dr. I. M. Puri, Entomologist; Mr. Raja Ram, Malarial Engineer; and Dr. N. D. Kehar, Biochemist.

(*b*) *Classes and Instructional work.*—The annual malaria class at Karnal was held from 18th March to 27th April 1935. Of the 20 students under training, 11 passed the examination at the end of the course. Of other workers who were given facilities for study at Karnal two were from East Africa, one from the United States and six from different parts of India. Two subordinate workers received training.

The Records of the Malaria Survey of India were edited by the Director The compilation of new bulletins and the production of revised editions of the older bulletins occupied a large amount of the time of the Director and his staff. Twenty-four papers were published in various journals by workers of the Survey and those in attached enquiries.

(*c*) *Anti-mosquito work.*—This included (*i*) experimental work oh the value and cost of Paris green for village work; (*ii*) the relative values of different insecticidal spraying solutions; (*iii*) the use of larvicidal fish; and (*iv*) preliminary experiments on the value of the "Entoray" machine in anti-malarial work.

(*d*) *Entomological investigations.*—These included (*i*) the range of flight of Anopheline mosquitoes; (*ii*) the chemical composition of water in relation to mosquito breeding places; (*iii*) seasonal distribution and numerical prevalence of different species of anophelines (larval and adult stages) in the Karnal district; (*iv*) bionomics of the anophelines of Quetta with special reference to types of breeding places, climatic conditions, range of flight, prevalence adult habits and habitat; (*v*) studies in the hibernation of *A. superpictus* and some other Indian anophelines; (*vi*) the study of a new species of Indian Anopheles and other species collected from Quetta; (*vii*) study of differences in strains of *Aedes aegypti* from various parts of India.

(*e*) *Field work and surveys.*—(*1*) *The Sind Malaria Enquiry* closed in June but before that date its more important activities were (*i*) the dissection of Anopheline mosquitoes from the water-logged area of Khairpur State and from a village near Sukkur, (*ii*) routine spleen and blood examination of school

children at Khairpur Mirs and Lokman ; (*iii*) the drafting of a report on " Malaria in Sind after the Lloyd Barrage and new canals came into operation "; (*iv*) a malaria survey of Quetta which was carried out under the auspices of the Government of India.

(B). *Air traffic and yellow fever prevention enquiry* (*Dr. Hicks*).—The objects of this enquiry were (*i*) to survey the Karachi air-port with reference to *Aedes aegypti* and *Anopheles* (*ii*) to examine the possibility of transport of mosquitoes in aeroplanes ; and (*iii*) to investigate the methods of preventing the introduction of mosquitoes into India by aeroplanes, in view of the danger from yellow fever. A report was submitted to the Government of India, which embodied the findings and recommendations.

(C). *Anti-malaria drugs enquiry.*—Dr. Hicks investigated the local action on the tissues of the new preparation of atebrin known as " atebrin musonate " or " atebrin for injection ".

(D). *Malaria surveys* of 7 villages in Karnal district involving 5,600 spleen and blood examinations of children, and of Quetta before and after the earthquake were carried out.

(E). *Malaria transmission enquiry by Lt.-Col. R. Knowles, at the School of Tropical Medicine, Calcutta.*—A paper entitled " Atmospheric temperature and humidity with reference transmission of malaria by *A. stephensi* " was submitted to the Indian Science Congress, 1936. It contains the conclusions reached and should be consulted for details. Briefly both temperature and relative humidity have been found to play an important part in the transmission of malaria with *A. Stephensi*. Under experimental conditions the percentage of survivals of this species was found heaviest in low temperatures and high humidities.

Work on filariasis with a view to determine the limits of atmospheric temperature and relative humidity at which transmission may occur was in progress. A paper embodying tentative conclusions was sent to the Indian Science Congress, 1936. There is evidence to show that both temperature and relative humidity play a very important part in the transmission of the disease to man by *Culex fatigans*. All the evidence shows that the monsoon period of Calcutta is that at which maximum infection of fed mosquitoes occurs, and that the cold weather is very favourable for the development of microfilariae in mosquitoes.

(F). *Field Malaria enquiry by Dr. K. V. Krishnan at the All-India Institute of Hygiene and Public Health, Calcutta.*—Two malaria field centres were started, the one at Naity, a low endemic malarial village, and the other at Abujhati, a hyper-endemic centre, with the object of comparing the prevailing conditions in these two places and, from the knowledge gained, for evolving a cheap method of rural malaria control. The work is in progress.

(G). *Black water fever enquiry by Dr. K. V. Krishnan at the All-India Institute of Hygiene and Public Health.*—The object of this enquiry is to study the mechanism of haemolysis in malarial haemoglobinuria of monkeys and to elaborate a line of treatment for the condition. The first part of the work is nearly complete and the evidence available indicates that in the mechanism of haemolysis leading to haemoglobinuria in monkeys three factors are probably involved, *viz.*, presence of a haemolysin ; alteration in the red cell membrane ; and alteration in the medium in which the red cells are suspended.

(H). *Assam Medical Research Society.*—The work of this Society comprised (*i*) an eight weeks' course in Malariology, (*ii*) Malarial surveys, (*iii*) experiments

at a treatment centre for the evaluation of the use of plasmoquine, (*iv*) entomological investigation to ascertain whether the breeding cycle of *A. minimus* was completed throughout the cold weather, (*v*) blood examinations; (*vi*) cold weather and premonsoon anti-larval control.

Nutrition.

113. *A Nutritional research by Dr. W. R. Aykroyd at I. R. F. A. Laboratory, Pasteur Institute, Coonoor.*—While much of the work done has been a continuation of that already in progress there have been a number of new developments, including a survey of Indian food stuffs and new lines of field work. The chief activities, besides the survey, included (*i*) spectographic detection of vitamin A and carotene; (*ii*) the estimation of carotene in food rich in the pigment lycopene; (*iii*) stone experiments; (*iv*) cheap "well-balanced" diets; (*v*) tissue culture; (*vi*) pathological changes in vitamin A deficiency; (*vii*) the isoelectric point of vitamin B; (*viii*) lethal factor for young rats in green leafy vegetables; (*ix*) cod liver oil in the treatment of burns and wounds; (*x*) an experiment to produce in rats conditions resembling human diabetes and liver cirrhosis; and (*xi*) experiments on rabies virus. Field work has included the examination of children in famine camps, schools, hostels and with the object of obtaining data about height and weight, and the incidence of food deficiency diseases.

B. Dietary research under the Bombay Presidency Baby and Health Week Association.—The I. R. F. A. sanctioned in September, 1935, a grant of Rs. 6,000 per annum for a period of three years to the Bombay Presidency Baby and Health Week Association for carrying out researches on cheap well balanced diets, both vegetarian and non-vegetarian. Experiments with various diets and their effects on height, weight, etc., are being conducted at the Byramji Jeejeebhoy Home and David Sassoon Industrial Boarding School.

Leprosy.

114. *Leprosy enquiry by Dr. J. Lowe at the School of Tropical Medicine, Calcutta.*—This enquiry is concerned with the pathology and bacteriology of human and rat leprosy. The main work during the year has been in connection with (*i*) culture of *M. leprae Muris* in tissue cultures; (*ii*) pathological and bacteriological studies of skin and nerve lesions in different forms of the disease in man; and (*iii*) the use of emulsions of the rat leprosy organism to test the bactericidal activity of certain preparations.

Plague.

115. (*A*). *Plague researches under the Director, Haffkine Institute, Bombay.*—These related to plague vaccine, anti-plague serum and the epidemiology of plague. In regard to plague vaccine work was done on the method of testing the virulence of plague cultures, the maintenance of the virulence of *bacillus pestis* cultures, optimum temperature for the growth of plague bacillus, a biological method for the standardisation of plague vaccine, the relative protective values of different plague vaccines, the protection afforded to guinea pigs by vaccine made from heat killed cultures; changes in the preparation of plague vaccine; relative protective values of supernatant fluid and the sediment of Haffkine vaccine and of vaccines made from heat-killed cultures and those made from live avirulent cultures.

Field and laboratory tests were carried out with buffalo and horse immune serum. Investigation into the epidemiology of plague showed that the percentages of survivors among rats from plague infection have a general

correspondence to the aggregate incidence of plague in the area from which the rats are obtained.

(*B*) *Plague recrudescence enquiry in the Cumbum Valley under the Director of Public Health, Madras.*—Study of the factors responsible for the recrudescence and carry over of infection, rat flea surveys in Cumbum and the surrounding villages and experiments in fumigation of grains were continued. A rat flea survey of Chellarkoilmethu on the Travancore Frontier at an elevation of 5,000 feet was also undertaken. Other studies were made on the effect of meteorological conditions, the climate of rat burrows and the value of cyanogas fumigation in plague prevention.

Vaccines.

116. *Anti-rabic vaccine enquiry at the Pasteur Institute of India, Kasauli.*—Experiments were continued to test the use of (*i*) anti-rabic serum as an adjunct to vaccine treatment in man, and (*ii*) live fixed virus in conjunction with anti-rabic serum as adjuncts to dead vaccine treatment of animals.

Tuberculosis.

117. *Tuberculosis enquiry by Dr. Ukil at the All-India Institute of Hygiene and Public Health, Calcutta.*—Two papers on sunlight experiments were published in the I. J. M. R. One described a new method for measuring the intensity of sunlight and the other dealt with the results of exposing inoculated guinea-pigs to direct and filtered sun's rays. Two papers on the incidence of tuberculosis infection in infancy and childhood were submitted for publication. Other studies included (*i*) culture and animal inoculation as methods for isolating tubercle bacilli from pathological materials; (*ii*) the portals of entry of the tubercle bacillus; (*iii*) types of tubercle bacilli found in pulmonary and extrapulmonary lesions; and (*iv*) the role of allergy and immunity in tuberculosis.

Kala-azar.

118. *Kala-azar enquiry at the School of Tropical Medicine, Calcutta, by Dr. R. O. A. Smith.*—Certain factors which might have been responsible for the poor results obtained in the transmission experiments were investigated. Smears from the throat and nasal mucous membranes of kala-azar patients were examined as routine for the presence of *Leishmania donovani*. Some work was also done on the bionomics of *P. argentipes* and the transmission of *L. donovani* by the use of wild *P. argentipes*.

Miscellaneous.

119. *Indigenous Drugs Enquiry by Bt.-Col. R. N. Chopra, I. M. S., at the School of Tropical Medicine.*—Chemotherapeutic studies were carried out in connection with malaria and intestinal amaebiasis both from experimental and clinical points of view. The study of the physical properties of blood after injection of cobra and viper venoms is in progress. A detailed study of the action of venoms of different snakes is also being carried out. The effects produced by emetine on the activity of the adrenal and thyroid glands were investigated in Belgian rabbits.

Researches on *moringa pterygosperma, Tylophora asthmatica, Digitalis lanata, Anthemis nobilis* and *Bambusa arundinacea* were completed. In addition a large number of inorganic preparations were also examined, *e.g., Lauha bhasma; Banga bhasma* and *Samudra phena.*

Study and investigations of certain indigenous drugs of the Punjab by Dr. K. S. Greval at the King Edward Medical College, Lahore.—The drugs studied included *Luffa acutangula, Tinospora cordifolia* and *Nirbasi.*

Enquiry into anaemia of women by Dr. L. E. Napier at the School of Tropical Medicine, Calcutta.—This work was carried out in direct continuity of that on anaemia in general amongst Assam tea-garden coolies. The tentative conclusion reached was that the incidence of this condition was chiefly a " conditioned " iron deficiency anaemia brought about by loss of blood from heavy hookworm infections in a population with a low iron intake.

Helminthological enquiry by Dr. P. A. Maplestone at the School of Tropical Medicine, Calcutta.—The work on the life history of the *gnathostome*, a common parasite of cats in Calcutta and occasionally found in the larval stage in human beings has been successful up to a point. The latex of certain local species of genus *Ficus* were examined for its usefulness in the treatment of trichuris. The presence of *Cysticercus cellulosae* in pigs in Calcutta was also studied.

Drug addiction enquiry by Bt.-Col. R. N. Chopra, I.M.S., at the School of Tropical Medicine, Calcutta.—Studies included (*i*) changes in the physical and chemical characteristics of the blood sera of opium addicts; (*ii*) habitual use of barbituric acid derivatives in India; and (*iii*) physical and mental effects produced by opium addiction. The treatment of drug addiction with special reference to India was dealt with in a paper published in the Indian Medical Gazette for March, 1935.

Medical mycology enquiry by Dr. P. A. Maplestone, School of Tropical Medicine, Calcutta.—By the employment of improved methods for the culture of fungi, it has been shown that *Trichophyton violaceum* really belongs to the genus *Achorion* and that three or four closely allied species or varieties which have hitherto been considered distinct are really identical. Work on the Actinomyces has been completed but results have not yet been analysed. Cases of skin diseases such as molluscum contagiosum, psoriasis, infective warts, herpes zoster and pityriasis rosea were treated with considerable success by injection of a filtrate prepared from material removed from the lesions.

Dracontiasis and filariasis enquiry by Dr. S. S. Rao, School of Tropical Medicine, Calcutta.—With a view to determine the incidence of guinea-worm infection, several districts in the Central Provinces and parts of the Nizam's Dominions were surveyed. Collections of cyclops from parts of C.P., Bombay Presidency, Hyderadabad State and Madras Presidency were identified. Feeding experiments of mosquitoes under controlled conditions of humidity and temperature were continued. Several drugs were tested for their effect on microfilaria and on the frequency of attacks of lymphangitis.

Protozoal parasites enquiry by Lt.-Col. H. E. Shortt, I.M.S., King Institute, Madras.—As regards tick fever of dogs, results of the study of the parasite *Babesia canis* in its vector the tick *Riphicephalus sanguineus* were submitted for publication. Other problems investigated were immunity against protozoal diseases in Babesiasis and malaria, the presence of *Leishmania donovani* in the nasal secretion of kala-azar cases; the possibility of transmission of surra by the ingestion of ticks infected in their preceding stage by feeding on infected animals; haemoproteus of the Gecko and its method of transmission; examination of plants (Enphorbia Sp.); sandfly serum; and trials with two fluids said to be effective against dog ticks.

Statistical enquiry under the Public Health Commissioner with the Government of India.—The compilation of weekly figures of incidence of cholera, smallpox and plague was continued.

Cancer in India by Dr. Viswanath.—This enquiry into the incidence of cancer in India, was further pursued this year in Madras and Rangoon. The data collected are being analysed.

Enquiry into the nature and natural reservoir of the virus of Tropical typhus in the Southern Command.—During the period 1st March 1935 to 31st January, 1936, various attempts were made to establish a strain of the virus of tropical typhus in the Southern Command Laboratory. Investigations were also made on animals likely to form a reservoir of infection in Poona.

Typhus enquiry by the Director, Pasteur Institute of India, Kasauli.—A systematic survey of the ectoparasites of wild rodents trapped in Kasauli and the neighbourhood was carried out. Most of the animals trapped were of the *Rattus rattus* group of which approximately 2,000 were examined. It has been proved that the wild rat is a reservoir of typhus in the Simla Hills area, and that the virus can be transmitted from rat to rat by rat fleas. There is also evidence to suggest that the rat flea is a probable natural vector of typhus in this area from rat to rat and from rat to man; but more experimental work is required before the possibility of other vectors can be excluded.

Enquiry into snake venoms and the production of anti-venene under the Director, C.R.I., Kasauli.—Although funds for this enquiry were sanctioned from 1st April, 1935, the work had begun in the previous year. Investigations were concerned with venoms of *V. Russellii* (daboia), *N. tripudiars* (Indian cobra) and *Echis carinata* (Phoorsa).

Investigation on the etiology of cataract by Lt.-Col. R. E. Wright.—This investigation was concerned with the possible effects of solar radiation in the production of cataract. Work done recently seemed to show that if solar energy produced cataract it was by virtue of the long heat rays. Experimental heat cataracts showed certain peculiar features.

The bacterial flora of the conjunctiva by Dr. B. P. B. Naidu.—This investigation was started in July, 1935 in collaboration with Lt.-Col. R. E. Wright. From a comparative study of the microscopic findings and the cultural and biochemical characteristics of the organisms so far studied, it appears that (1) the pathogenic organisms of the conjunctiva are not so easily cultivable on artificial culture media as when they are isolated from other situations, (2) their viability in subcultures even on suitable media is relatively poorer than the latter and (3) heated human blood agar and heated pigeon blood agar have proved to be more suitable for the isolation and repeated subcultures of Morax-Axenfeld bacillus and the Koch-Week's bacillus.

Enquiry into the etiology of splenomegalic conditions in Bengal by Dr. M. N. De.—This investigation was undertaken to determine the nature of splenomegaly not associated either with leishmaniasis or chronic malaria. The sources from which materials were collected were necropsy cases from the Medical College Hospitals, Calcutta, as well as from cases which had been subjected to laparotomy in the different hospitals of Calcutta. The work is in progress.

Epidemic dropsy enquiry under the Directors of the School of Tropical Medicine and the All-India Institute of Hygiene and Public Health, Calcutta.—Although this disease was previously under investigation at the School of Tropical Medicine, the Indian Research Fund Association gave a grant for further investigations in 1934 when a wide epidemic occurred in the rural areas of Bengal and Bihar and in Benares. The clinical and experimental part of the work was done by the staff of the School. Investigations were made on the biochemical, pathological and epidemiological aspects of the problem. The work is in progress.

SECTION IX.

MEDICAL INSTITUTIONS.

I.—Hospitals and Dispensaries.

A.—British India.

General and Statistical.

120. At the end of 1935 in British India there were 6,700 hospitals and dispensaries following the western system of treatment,—an increase of 54 over 1934. Of the total, only 552 or 8% were controlled by private organisations; the rest were maintained by Government, municipal and district boards and railways. On an average, 40,185 persons were served by each institution.

Table IX(*i*) gives the numbers of institutions by areas and population.

TABLE IX (*i*).

Hospitals and dispensaries.

	Classes I, III and IV.		Classes II and VI.		Class V.		Total.		Average population served per institution, 1935.
	1934.	1935.	1934.	1935.	1934.	1935.	1934.	1935.	
British India . .	5,237	5,294	860	858	549	552	6,646	6,700	40,185
N.-W. F. P. . .	70	71	35	36	10	11	115	118	39,698
Punjab . . .	780	782	181	170	8	7	969	959	24,589
Delhi . .	25	26	2	2	...	7	27	28	22,723
U. P. . . .	493	503	110	112	83	83	686	698	71,081
B. & O. . . .	540	539	84	85	66	66	690	690	54,605
Bengal . . .	1,012	1,046	119	119	179	177	1,310	1,342	37,342
C. P. . . .	230	232	53	53	53	54	336	339	45,745
Bombay . . .	414	415	79	79	40	40	533	534	56,783
Madras . . .	1,186	1,195	76	77	94	91	1,356	1,363	34,624
Coorg . . .	11	11	...	...	3	...	14	14	11,666
Assam . . .	210	215	43	44	7	8	260	267	34,636
Burma . . .	231	226	68	71	2	4	301	301	48,728
Baluchistan . .	35	33	10	10	4	4	49	47	...

Of the total, 4,313 institutions were in rural, 2,326 in urban areas (excluding those in Delhi Province) and 33 in the Agencies in N.-W. F. P. On an average, 61,874 persons were served by each institution in rural and 12,039 in urban areas. Further progress in the provision of medical relief, particularly in rural areas, was slowed down owing to financial stringency. Table A in Appendix VIII (page 262) gives the distribution of these institutions in rural and urban areas in the different provinces and the populations served by each.

A large decrease occurred in the accommodation for in-patients in State-special, railway and private non-aided institutions, the number of beds falling from 14,283 in 1934 to 9,499 in 1935. This decrease was, however, counterbalanced to some extent by an increase of 2,089 beds in State-public, local

Abbreviations:—

M. . . .	Male.	Class I.—State-Public.	
F. . . .	Female.	Class II.—State-special.	
R. . . .	Rural.	Class III.—Local, municipal fund and subsidised dispensaries.	
U. . . .	Urban.		
p.m. . .	per mille.		
C. P. . .	Central Provinces and Berar.	Class IV.—Private-aided.	
U. P. . .	United Provinces of Agra and Oudh.	Class V.—Private non-aided.	
B. & O. . .	Bihar and Orissa.	Class VI.—Railways.	
I.G.C.H. . .	Inspector-General, Civil Hospitals.		
P.U.O. . .	Pyrexia of uncertain Origin.		

fund and private aided hospitals and dispensaries, but the total number of beds in all classes (69,289) still was less by 2,695 beds than in 1934. Accommodation reserved for female patients was 42% less than that for males. Table B, Appendix VIII (page 263) gives details of beds in the different provinces.

Table IX (*ii*) shows the numbers of patients treated in hospitals, etc. The number of female patients attending for treatment was 40% less than the number of males. In the Madras Presidency only is the western system of treatment almost equally popular with both sexes.

TABLE IX (*ii*).

Patients treated.

	Classes I, III and IV.			All Classes.		
	Indoor.	Outdoor.	Total.	Males.	Females and Children.	Total.
British India	**1,170,962**	**65,663,716**	**66,834,678**	**48,972,299**	**29,480,865**	**78,453,164**
N.-W. F. P.	31,128	1,933,352	1,964,480	1,618,211	610,380	2,228,591
Punjab	212,860	13,646,068	13,858,928	9,383,667	5,813,487	15,197,154
Delhi	18,336	164,900	183,236	717,724	399,119	1,116,843
U. P.	127,844	7,509,951	7,637,795	6,181,365	2,976,061	9,157,426
B. & O.	82,680	5,514,454	5,597,134	5,119,723	2,072,154	7,191,877
Bengal	124,297	7,730,307	7,854,604	7,118,443	3,035,323	10,153,766
C. P.	39,552	3,067,555	3,107,107	2,494,092	1,149,594	3,643,686
Bombay	124,093	3,227,155	3,351,248	2,469,278	1,474,121	3,943,399
Madras	245,590	16,570,958	16,816,548	9,373,353	8,484,985	17,858,338
Coorg	4,996	295,719	300,715	214,996	1,068,886	1,283,882
Assam	19,051	2,251,570	2,270,621	1,738,310	779,569	2,517,879
Burma	131,235	3,046,049	3,177,284	2,010,420	1,434,925	3,445,345
Baluchistan	9,300	705,678	714,978	532,717	182,261	714,978

Special hospitals for the treatment of female patients are few in number and are ordinarily to be found only in headquarter and other urban centres. These number in the U.P. 81, the Punjab 40, in Madras 37, in C.P. 12, in Bengal *muffasal* 8, in Calcutta 6, in B. & O. 5, in Burma and in N.-W. F. P. 4 each. Of these 197 institutions, 25 were maintained by Government, 92 by municipal and other local bodies and 80 were private institutions aided by Government. In addition, however, facilities for the treatment of women were generally available in all hospitals and dispensaries.

Table C in Appendix VIII on page 264 gives the numbers of beds for women in general and special hospitals and numbers of patients treated.

The medical personnel employed in the different provinces comprised I. M. S. officers 172, W. M. S. officers 41, I. M. D. 103, salaried graduates or M. B., B. S. 1,798 and licentiates 6,598. Provincial figures are given in Table IX (*iii*). In most provinces, increased numbers of W. M. S. officers and other medical staffs were employed.

TABLE IX (*iii*).

Medical Personnel.

	I. M. S.	W. M. S.	I. M. D.	Salaried graduates.	Salaried Licentiates.
Total	172	41	103	1,798	6,598
N.-W. F. P.	13	2	8	23	97
Punjab	19*	..	19	188§	931
Delhi	2	12	4	22	28
U. P.	17	19	2	219	591
B. & O.	12	1	4	199	772
Bengal	23	..	15	391	1,402
C. P.	5	5	3	72	168
Bombay	18	..	9	245	553
Madras	30†	2	..	319	1,400
Coorg	..	..	..	1	16
Assam	12	..	4	42	284
Burma	16	..	5	77	340
Baluchistan	5‡	..	30	..	..

*Does not include the 3 I. M. S. officers employed as Professors in the King Edward Medical College, Lahore, 1 as Medical Superintendent, Punjab Mental Hospital, Lahore, and 1 as Chemical Examiner to Government, Punjab.

†Including I. M. D. officers.

‡Including 3 part time I. M. S. officers—one at Chaman and two at Fort Sandeman.

§Does not include Assistant Surgeons employed in the Chemical Examiner's Department and the Mental Hospital, Lahore, as well as those employed in the King Edward Medical College, Lahore, and not attached to the Mayo Hospital.

Honorary Medical staff.—It is becoming more and more the practice to associate selected private medical practitioners in an honorary capacity with the staffs of Government hospitals and their numbers are steadily increasing. During 1935, a total of 674 medical graduates and 244 licentiates were so engaged, and meantime most of these gave their services at provincial and district headquarter hospitals. Provincial figures are given in Table IX (*iv*) below.

TABLE IX (*iv*).

Honorary Medical Staff.

	Graduates.	Licentiates.
Total	674	244
N.-W. F. P.	..	..
Punjab	14	4
Delhi	...	..
U. P.	44	25
B. & O.	15	3
Bengal.	259	99
C. P.	18	2
Bombay	163	13
Madras	133	79
Coorg	..	3
Assam	4	4
Burma	24	12
Baluchistan	..	..

Nursing Services.—Nurses Registration Acts have been passed by the provincial legislatures of Bengal, Bombay, Burma, Madras, Punjab and U. P. and it is hoped that other provinces will shortly follow their example.

In every province, existing nursing taffs sfall far short of actual requirements, particularly in the rural institutions. Whilst in-patients totalled 1,170,962 in state-public, local fund and private-aided institutions, the total number of nurses employed numbered only 3,879.

Table IX (*v*) gives the numbers of nurses employed in rural and urban areas and figures of expenditure.

TABLE IX(*v*).

Number of Nurses and Expenditure on nursing.

	No. of nurses.			Expenditure on nursing.	
	Rural.	Urban.	Total.	Total.	Per case treated.
				Rs.	Rs. A. P.
Total	267	3,612	3,879	3,892,698	3 5 3
N.-W. F. P.	..	85	85	41,241	1 5 2
Punjab	6	276	282	315,316	1 7 8
Delhi	..	147	147	168,336	9 2 11
U. P.	30	324	354	223,160	1 11 11
B. & O.	50	215	265	137,112	1 10 6
Bengal	3	596	599	654,604	5 4 3
C. P.	12	94	106	95,185	2 6 6
Bombay	17	732	749	645,624	5 3 3
Madras	96	654	750	968,201	3 15 1
Coorg	3	4	7	8,662	1 11 8
Assam	14	10	24	93,795	4 14 9
Burma	36	473	509	531,612	4 0 10
Baluchistan	..	2	2	9,850	1 0 11

In Bengal Presidency, arrangements for nursing in Calcutta, with the exception of the Presidency General Hospital and in *muffassil* hospitals remained unsatisfactory partly owing to shortage of funds and partly to insufficiency of trained nurses. The 1934 Bengal Nurses Registration Act has been enforced and a Nursing Council has been constituted. Registered nurses numbered 887.

Training for the " senior certificate " of nursing was provided in the Calcutta Medical College and the Presidency General Hospital, Calcutta ; that for the " junior certificate " in 2 hospitals in Calcutta and in 9 in the *mufassil*. Of the 258 pupils under training 16 obtained the " senior certificate " and 31 the " junior certificate ".

The Calcutta Hospital Nurses Institution provides nurses for the Presidency General Hospital and the Medical College Hospitals, but was considerably handicapped by lack of funds and of suitably qualified nurses. The Government sanctioned a scheme under which it was hoped to attract suitable Indian women for training in the Medical College group of hospitals. In the *mufassil*, trained nurses were available only in eleven district *sadr* hospitals and in seven mission hospitals, but nowhere was their number adequate. In other institutions, untrained male and female attendants, *dais*, midwives, ward servants and compounders were employed to carry out such nursing work as they could.

In the C. P. the numbers of nurses employed in provincial hospitals were inadequate. The Mayo Hospital, Nagpur, the Victoria Hospital, Jubbulpore, and the Irwin Hospital, Amraoti, continued to provide training for probationer nurses; staff nurses were employed at the main hospitals at Saugar, Wardha and Akola. In Assam only the two civil hospitals at Gauhati and Dibrugarh had trained European nursing sisters. In N.-W. F. P. also arrangements for nursing were very inadequate.

Subsidised practitioners.—Further progress was made during 1935 in extending medical aid to the rural population. In Madras Presidency, 428 subsidised dispensaries were at work, whilst in the Punjab, the sanctioned programme of 375 dispensaries was only 15 short of completion. Other provinces do not seem to have made such satisfactory progress. In the U. P. only 21 subsidised medical practitioners had settled in rural areas, whilst in B. & O., N.-W. F. P., Bengal and the C. P. the numbers were even smaller.

Surgical operations.—A total of 2,569,967 principal and 82,643 secondary operations were performed in state-public, local fund and private-aided institutions. Table D in Appendix VIII on page 264 gives numbers by provinces.

Expenditure.—Out of the total expenditure of Rs. 3,92,54,573 on the maintenance of state-public, local fund and private-aided hospitals and dispensaries, Rs. 1,87,78,552 came from Government and Rs. 1,48,62,309 from municipal and local funds. Of the total, Rs. 1,01,12,991 were spent on the employment of medical officers, Rs. 38,92,698 on nurses, Rs. 30,26,610 on diet and Rs. 41,60,051 on medicines. Tables E and F in Appendix VIII on pages 265 and 266 give figures of income and expenditure for the different provinces.

Provincial.

121. Details in regard to malaria, ankylostomiasis, tuberculosis, venereal diseases, beri-beri, leprosy, trachoma and guineaworm have already been given in Section II of this report. Provincial reports should be consulted in regard to the figures for other diseases.

In the N.-W. F. P., 31,128 indoor patients were treated of which 860 died, giving a death rate of 2·76 p. m. The four female municipal hospitals at Peshawar, Dera Ismail Khan, Bannu and Kohat, maintained in the past by Government grants, treated 3,474 indoor and 76,285 outdoor cases. The eight subsidised dispensaries treated 60,222 patients. Two travelling motor dispensaries were attended by 3,646 cases. The dispensary medical officers continued to visit neighbouring villages and treated 87,072 patients. The medical relief in the Agencies received greater attention; the construction of a well equipped hospital was sanctioned for Miranshah in North Waziristan.

In the Punjab, the scheme for the provincialization of hospitals at district and *tahsil* headquarters remained in abeyance. A new hospital was constructed at Abhor and the Rai Bahadur Amar Nath Tuberculosis Institute was added to the Mayo Hospital, Lahore. The opening of a Tuberculosis sanatorium at Simla has already been mentioned. A great strain was thrown on the medical resources of the province owing to the influx of victims of the Quetta earthquake.

In regard to women arrangements existed at nearly all state-public and local fund institutions for their examination and treatment. At the close of the year, there were 50 separate hospitals under the charge of medical women and 33 women doctors were in charge of the female sections of general hospitals. The numbers of women medical students continued to increase

both at Medical College, Lahore, and the Medical Schools, Amritsar, and Ludhiana and the demands for admission were far in excess of available vacancies. Additional facilities were provided for the training of medical women by reserving 7 seats for Punjabi students at the Lady Hardinge Medical College, Delhi, 10 seats for women students at the King Edward Medical College, Lahore, and 15 at the Medical School, Amritsar. The Punjab Medical School for Women in Ludhiana now admits each year 36 students to the medical licentiate class. The Punjab Dental Hospital, Lahore, treated 26,875 patients and provided abundant clinical material for teaching purposes.

In Delhi, the municipal committee maintained the Silver Jubilee Tuberculosis Hospital and the Civil (Dufferin) Hospital with eight branches in Delhi city ; the New Delhi Municipal Committee met the cost of the Willingdon Hospital, including the Willingdon Nursing Home and 2 other branch dispensaries, whilst the District Board maintained 5 dispensaries. Rapid progress was made with the construction of the Irwin Hospital.

In the U. P., the scheme for post-graduate studies for officers of the Provincial Subordinate Medical Service was further extended, but the introduction of an advanced course of study at the Agra Medical School remained in abeyance. The appointment of honorary physicians, surgeons and dental surgeons continued to receive encouragement from Government. Subsidies were continued in order to encourage qualified medical practitioners to settle in rural areas. The scheme for augmenting medical relief in rural areas made satisfactory progress, but more money is needed for this purpose. Only 47 subsidised dispensaries and 21 subsidised medical practitioners were available in the province, the main cause for the slow development of the subsidy scheme being the absence in out-of-the-way villages of social amenities for the medical officers. The total medical personnel of the province numbered 988, an increase of 44 over the present year. The proposed central tuberculosis clinic at Allahabad and the Tuberculosis Hospital at Lucknow could not be opened for want of funds. The Nurses Registration Act, which was passed during the year, was not enforced because of financial difficulties.

In B. & O., the special grants for the treatment of kala-azar and venereal diseases were renewed to *Sadr*, sub-divisional and other important hospitals.

As regards Bengal, 45 institutions provided for the needs of the people in Calcutta ; 22 of these treated out-patients only and the others dealt with both out and in-patients. The total number of beds was 3,723, of which 1,835 were for males and 1,294 for females. Cases treated in all classes of hospitals and dispensaries numbered 976,216, comprising 70,622 in-patients and 905,594 out-patients. In the *mufassil*, 1,298 hospitals and dispensaries, of which 750 were rural and 548 urban provided 6,067 beds, 4,478 for males and 1,589 for females. A total of 258 pupil nurses were under training at 11 centres ; 16 passed the senior and 31 the junior certificate examination. The scheme for establishing a new training centre at the Campbell Hospital mainly for Indian nurses was under consideration.

In the C. P., the number of hospitals and dispensaries was 339,164 in rural and 175 in urban areas. The inadequacy of medical relief is indicated by the fact that each dispensary served an area of 476 square miles. Independent medical practitioners held honorary appointments as physicians, surgeons, dentists and specialists in the eye, ear, nose and throat departments at the Mayo Hospital, Nagpur, the Victoria Hospital, Jubbulpore, the Irwin Hospital, Amraoti, the Silver Jubilee Hospital, Raipur, and the Main Hospital, Akola. Government approved of the proposal to establish tuberculosis clinics at each divisional headquarters and at the Union Mission Tuberculosis Sanatorium at Pendra Road in Bilaspur District.

In Bombay Presidency, a new hospital with 49 beds was constructed at Thana at a cost of Rs. 2 lakhs. It was hoped that, with the opening of this hospital and with improvements carried out in other suburban hospitals, the congestion in Bombay City institutions would be considerably relieved. In order to improve the efficiency of the subordinate medical staff it was decided to send all new recruits to the civil hospitals at Poona and Ahmedabad for 6 months' practical training and for one month's additional training in hygiene and preventive medicine. Arrangements were also made to give the second assistants at Civil Hospitals training in clinical laboratory work and venereology at Poona and Ahmedabad. Training in X-ray, mental diseases, leprosy and other diseases was also provided in order to have a cadre of officers with special qualifications. In respect of medical aid in rural areas, it was concluded that before any comprehensive and efficient scheme of rural medical relief could be launched, it was essential that financial help should be forthcoming from private or local bodies to supplement the contributions from Government which amounted to two-fifths of the cost in the case of district board dispensaries, two-sevenths for municipal dispensaries and nine-tenths for district headquarter hospitals. As in other provinces, it was found difficult to induce medical practitioners to leave the social amenities of the towns for work in isolated rural tracts.

In Madras Presidency of a total of 1,363 medical institutions, 1,116 were in rural and 247 in urban areas. The practice of appointing honorary medical officers to Government hospitals was further developed. In respect of anti-rabic treatment, 21 medical officers were given a special training at the Pasteur Institute in Coonoor.

In Assam, several important advances were held in abeyance because of financial stringency ; the question of providing a hospital for males in Shillong was still under consideration. Public philanthropy made possible the construction of a maternity and gynaecological ward in the Civil Hospital at Dibrugarh and a Child Welfare Centre at Nowgong. Seven new dispensaries were opened in rural areas, including one private non-aided dispensary. The Ganesh Das Red Cross Hospital for Women and Children in Shillong was opened at the close of the year. A new hospital and dispensary at Sadiya and a maternity block at Karimganj were under construction.

In Burma, important new works included the construction of an additional female ward at Maymyo, an operation theatre at Yandoon, a ward at Danubyu, an isolation ward at Henzada and a maternity ward at Monywa. Two new Nurses' Homes were built at Maymyo and Mandalay by means of private donations. The eye department at the Mandalay Hospital was extended and new X-ray apparatus were provided for the Maymyo and Mandalay hospitals. It is worth noting that a blood transfusion service was organised for the Rangoon General Hospital and 13 transfusions were given in the course of the year.

In Baluchistan as a result of the earthquake in Quetta, the municipal dispensary, the Mission Hospital and the Lady Sandeman Dufferin Hospital were completely destroyed. As usual, the civil dispensary at Ziarat remained open for the summer months and the C. M. S. dispensary which works at Mastung during the summer and at Dhadar during the winter continued to treat large numbers of outdoor patients.

The earthquake was the cause of great suffering in addition to many thousands of deaths. Medical relief was quickly organised and evacuation of the injured was carried out expeditiously and satisfactorily. Temporary dispensaries were opened in the refugee camp on the race-course and at the brewery camp. The civil hospital in Quetta which had been totally destroyed

was immediately re-opened in tents provided by the military authorities and by the end of the year huts were constructed which provided bed accommodation for 100 patients. Two special hospitals for victims of the earthquake were opened at Pishin and Mastung by Mission doctors. A military relief party, with two I. M. S. officers and a Field Ambulance, was sent to Mastung, and the Kalat hospital staff was transferred to Mangchur for relief work. Many injured persons were also treated in the hospitals at Sibi, Loralai, Chaman, Pishin and Fort Sandeman.

B.—Indian States.

122. In Mysore State, the 281 medical institutions provided 2,574 beds for in-patients, 1,170 for males and 1,404 for females. Thirty-one hospitals and dispensaries for females provided treatment for 16,129 in-patients, including 9,005 cases of child-birth. The fact that malaria cases totalled over 800,000 indicates that this disease is widespread ; respiratory diseases were also very common. The 287 midwives conducted 27,062 labour cases, an average of 94 cases each. The Princess Krishnajammanni Sanatorium dealt with 343 in-patients and 1,668 out-patients. 204 lepers were treated as in-patients in the Leper Asylum in Bangalore and the out-patients' dispensary at Kalasipaiyam and the Local Fund Dispensaries at Hosur and Malvalli treated 91 cases. Propaganda was carried on against leprosy and a film on leprosy was prepared. The McGann Hospital, Shimoga, was opened. The Lakshmidevamma's Children's Hospital at Bangalore was nearing completion, and a maternity hospital with an out-patient block at Shimoga, was under construction. The construction of a new and up-to-date hospital at Kolar at an estimated cost of Rs. 85,000 was sanctioned.

II.—Mental Hospitals.

123. A total of 19 mental hospitals provided accommodation for 9,608 patients (7,351 males and 2,257 females). The actual number of patients housed in these hospitals was, however, 13,329 (10,301 males and 3,028 females) or 39% in excess of available accommodation. In the appendix to this section Table H shows that, particularly in the Punjab, C. P., Bombay and Madras, severe overcrowding existed.

Other tables in the Appendix give the admissions, total population, daily average strength, daily average sick, numbers cured and total deaths, the principal types of insanity treated, details of the causes of insanity, details of admissions by age-groups and religions respectively, and expenditure incurred on the maintenance of these mental institutions.

In Bombay Presidency, 174 deaths occurred during the year, the death rate being 7·7% as against 7·5% in 1934, but the health of the patients, despite overcrowding, was generally good and, if anything, slightly better than during the previous year. The chief causes of death were malaria, tuberculosis, dysentery, anaemia, nervous diseases and pneumonia. The Hyderabad mental hospital recorded the low death rate of 5·5%. In an attempt to solve the problem of over-crowding, the Bombay Government sanctioned the provision of 250 beds at the Central Mental Hospital, Yeravda, in addition to the new block of 41 beds for Parsee patients which was nearly completed. The question of providing 100 additional beds at Ahmedabad was also under consideration. In the Central Provinces, deaths numbered 30, giving a rate of 6·3%. Most of the deaths were among patients between 60—70 years of age. In Assam, 35% of the inmates were admitted in good health, 34% in indifferent and 31% in bad health. A total of 91 deaths was

recorded during the year, giving a rate of 13·5%, the chief causes being tuberculosis of the lungs (33) and dysentery (33). All inmates were repeatedly examined for tuberculosis and suspicious cases were segregated. In Madras Presidency, 130 deaths occurred giving a rate of 7·1%. In view of the shortage of accommodation, the local Government approved a scheme for extension of the Madras Mental Hospital at an estimated cost of Rs. 2,17,000. The question of finding funds for the construction of an additional block in the Waltair hospital was also under consideration. In the Punjab, the death rate was 3·96%. Of the 44 deaths recorded, 7 were due to *status epilepticus*, 6 to pneumonia and 4 to tuberculosis. In the United Provinces the number of deaths fell to 96 and the death rate to 6·8%. In the Ranchi Indian Mental Hospital the death rate was only 3·5%. Of the 88 cases treated with *sulfosin*, 3 recovered, 50 improved and 35 showed no change. In the European Mental Hospital, Ranchi, where the latest methods of treatment were in vogue, the death rate was 4·2%. No epidemic or infectious disease was experienced during the year and only few patients were confined to bed for physical reasons other than feebleness of age. Some additional accommodation was made possible by internal re-arrangement. The death rate in the mental hospitals was 7·9%. Of the 90 deaths recorded in Tadagale mental hospital many were cases of general paralysis admitted at a stage when treatment was of no avail.

III.—Medical Colleges.

124. Medical colleges numbered 10, two each in the Presidencies of Bengal, Bombay and Madras and one each in the Punjab, Delhi, U. P. and Bihar. The college in Delhi is exclusively for women ; women students are also admitted to the others.

During the year, 68 of the 143 final year students in the K. E. Medical College, Lahore, passed the final M. B., B. S. examination ; 15 out of 20 passed part A and 14 out of 19 passed part B in the Lady Hardinge Medical College in Delhi ; 91 out of 115 passed part I and 36 out of 68 passed part II in the King George's Medical College at Lucknow ; and 13 out of 25 passed part I and 18 out of 41 passed part II in the Prince of Wales' Medical College at Patna.

Eighty-two of 192 students passed the final M. B., B. S. examination at the Medical College in Calcutta. In the membership medical faculty final examination (new regulations) 4 passed out of 9 ; in part I (old regulations) 12 passed out of 15 and part II (old regulations) 3 passed out of 4. Seventy-six students passed the final M. B. examination and three the State Medical Faculty examination from the Carmichael Medical College, Belgachia.

In the Grant and the Seth Gordhandas Medical Colleges in Bombay, passes in the final M. B. B. S. examination were as follows : In the former college 63 males and 11 females in group A and 46 males and 11 females in group B ; in the latter a total of 41. In addition, 2 obtained the M. D. ; 3 the M. S. ; 1 the B. Hy. part I and 4 part II ; 3 the B. Sc. ; and 4 the L. C. P. & S.

In the Madras Medical College, 71 students passed the final M. B., B. S., part II ; 18 passed part I and 24 part II from the Vizagapatam Medical College.

Medical Research.

125. The following short paragraphs make mention of the activities of various medical colleges in the field of medical research.

Medical College, Lahore.—Investigations were made on (*a*) the nature of pulmonary tuberculosis in adult Punjabis ; (*b*) postural hypotania ; (*c*) cancer

in India ; (*d*) vitamin ' A ' contents of ghee ; (*e*) indigenous drugs of the Punjab ; (*f*) clinical evidence of rheumatic fever in the Punjab ; and (*j*) chronic encephalitis lethargica.

King George's Medical College, Lucknow.—The Department of Anatomy carried out research on (*1*) the relative position of the *ductus deferens* and ejaculatory ducts in the squirrel, the mongoose, the white rat and the porcupine, with special reference to their morphological significance and (*2*) the relative dimensions and capacities of the various cranial air sinuses. Anthropometric investigations on the human bony orbit were also made. The Department of Physiology contributed over 22 papers to the proceedings of the Science Congress held at Indore in January, 1936. These dealt with (*1*) investigations on enzymes and temperature reflexes ; (*2*) studies in the diets of various classes, examination of their efficacy and the collection of data relative to the alkali reserve of U. P. inhabitants ; (*3*) study of insulin ; (*4*) data on the vital capacities of students ; (*5*) studies of intraocular tension ; and (*6*) anaesthetic drugs.

Prince of Wales' Medical College, Patna.—A research paper entitled " Distribution of Vitamin ' C ' in different parts of common Indian Food-stuffs " was sent to the " Biochemical Journal of England " for publication and abstracts of papers on (*1*) " Observations on the action of ergotamine " and (*2*) " An investigation on the action of evipan sodium on the blood sugar of rabbits " were communicated to the Science Congress held at Indore.

Medical College, Calcutta.—Papers were published on (*1*) bacteriology in relation to clinical medicine ; (*2*) a case of unusual congenital malformation ; (*3*) epidemic dropsy with special reference to the development of cutaneous nodules ; (*4*) nodular erruptions in epidemic dropsy ; (*5*) pathology of epidemic dropsy ; (*6*) pathology of the heart in acute infections ; (*7*) verruga erruptions in epidemic dropsy ; (*8*) retro peritoneal hernia ; (*9*) an investigation on the absorption of carotene (provitamin A) in human subjects ; (*10*) disorders of digestion in children ; (*11*) epidemic dropsy discussions at the British Medical Association ; (*12*) treatment of hookworm anaemia with massive doses of iron ; (*13*) thrombo angeitis obliterans ; (*14*) unilocular cystic kidney in a child ; and (*15*) blindness in India. Under the auspices of the Indian Research Fund Association, research work in connection with splenomegaly in Bengal was carried out.

Seth Gordhandas Sunderdas Medical College, Bombay.—With the help of grants received from the Indian Research Fund Association and the Sir Dorabj Tata Trust, an enquiry into the essentials of a cheap well-balanced nutritious diet was undertaken. Other investigations included (*1*) bacteriological investigations by blood culture in certain eye diseases ; (*2*) mycetoma or fungus foot disease ; (*3*) development of the body parts of children between approximately 6 to 11 years of age ; and (*4*) incidence of pneumococcal types of infection in Bombay with a view to the preparation of a specific serum.

Grant Medical College, Bombay.—The Department of Ophthalmology published papers on eye diseases resulting from improper diet and the Physiology Department papers on the " Evolution of man's diet " and " A study of the human electrocardiogram". In the Department of Anatomy measurements of the Indian pelvis in a fresh state were being determined in order to compare the same with European figures. Dissections of foetuses and babies were carried out to co-relate the embryological facts with gross anatomy and a film on the development of the heart was prepared. Work done in the Department of Pathology included, *inter alia*, researches on (*1*) sudden death with special reference to heart lesions and *post mortem* serology;

relation of status thymolymphaticus with death ; (*3*) incidence of syphilis ; (*4*) a reliable test for sugar in urine ; (*5*) tubercle bacilli in cerebrospinal fluid and the effects of inoculation on guinea-pigs ; (*6*) cerebro-spinal fluid in jaundice ; (*7*) urinary amoebiasis ; (*8*) tubercle bacilli in stomach contents of babies ; (*9*) secretion of HCL in infants ; and (*10*) reaction of guinea-pigs to tetanus toxin in human serum and cerebro-spinal fluid.

Medical College, Madras.—A paper on " An enquiry into the origin of non-pulmonary tuberculosis " was submitted by the Department of Bacteriology to the Indian Science Congress. In the Department of Midwifery, special work was done in eclampsia and diseases of the placenta. The Department of Ophthalmology published 31 papers on its investigations into diseases of the eye. The Department of Operative Surgery continued work on the value of a vaso-motor index in the treatment of vasospastic disease and published papers on (*1*) lumber sympathectomy in the treatment of circulatory diseases ; and (*2*) cyst of the spleen ; (*3*) the pathology of tuberculosis ; and (*4*) heterotopic bone in elephantoid tissues. The Department of Pathology published an article on tuberculosis of mammary glands. Investigations were made into a rare case of dermal reticulosis ; tuberculosis in rare situations ; and a rare type of tumour called " Epitheliom adenoids cysticum ". Results were published in three papers.

IV.—Medical Schools.

126. Medical schools numbered 28, 10 in Bengal ; 3 in Madras ; 5 in Bombay ; 2 in U. P. ; 2 in Punjab ; 2 in B. & O. ; 1 in Burma ; 1 in C. P. ; 1 in Assam ; and 1 in Central India.

In the Amritsar Medical School, Punjab, the percentage of passes in the final L. S. M. F. examination was 67·5 in April and 61·5 in September. Eleven passed the final L. S. M. F. from the Ludhiana Medical School for Women. Forty students from the Agra Medical School passed the final examination part I and 56 part II ; from the Agra Women's Medical School 18 passed part I and 17 part II of the final examination. Thirty-five students from the Medical School, Darbhanga in B. & O. passed the licentiate examination ; 29 including 2 females passed from the School at Cuttack. In Bengal, 79 students passed the final examination of the State Medical Faculty and 37 passed the compounders' examination from the Campbell School, Calcutta ; 22 and 13 from the Lytton School, Mymensingh ; 40 and 22 from the Ronaldshay School, Burdwan and 73 and 31 from the Dacca Medical School. A total of 24 passed the final examination from the Chittagong School ; 15 from the Jackson School, Jalpaiguri ; 33 from Bankura Sammilani School ; 58 from the National Medical Institute, Calcutta ; and 73 from the Calcutta Medical School. In C. P., 39 students passed the final board examination from the Robertson Medical School, Nagpur. From the K. E. Medical School at Indore, three students passed the final L. C. P. & S. (Bombay), 44 the final L. M. P. (Nagpur), 1 final L. M. F. (Calcutta), 30 S. A. S. grade examination and 54 compounders examination. Twenty-five passed the L. C. P. S. final examination from the B. J. Medical School, Poona ; 23 from the B. J. Medical School, Ahmedabad ; 15 from the Medical School, Hyderabad ; 29 from the National Medical College, Bombay ; and 11 from the Christian Medical School, Miraj. Twenty-three students passed the final examination part I and 55 part II from the Stanley Medical School, Madras ; 23 and 31 in the Lady Willingdon Medical School for Women, Madras ; and 45 part II from the Missionary Medical School for Women at Vellore. Thirty-six students from the Berry-White Medical School in Dibrugarh passed the final examination ; 25 from the Rangoon Medical School passed part I of the final examination and 33 passed part II.

127. *The Countess of Dufferin's Fund.*—A total of 331 women students were on the rolls in different medical colleges in India. Twenty-seven scholarships were awarded, 18 at the Lady Hardinge Medical College, Delhi and 3 each at Bombay, Madras and Calcutta. Of these scholarships, 18 were awarded from Association Funds and the remainder from the Trust administered by the Dufferin Council.

The extent of the work done in Dufferin Hospitals may be estimated from the following figures :—

New in-patients	157,331
Out-patients (old and new)	6,510,313
Gynaecological cases—	
Indoor	9,813
Outdoor	79,270
Midwifery cases—	
Abortion	1,875
Normal labour	8,949
Abnormal labour	3,127
Operations—	
Abdominal	1,475
General or spinal anaesthesia	10,593

SECTION X.

HEALTH OF JAILS IN INDIA.

Population, Sickness and Mortality Rates.

128. During 1935 a slight increase occurred in the average daily jail population (excluding Andamans), the figure being 143,579 or 1,684 more than in 1934 but 555 less than the quinquennial mean. Increases occurred only in Bengal (+978), Madras (+959), B. & O. (+373), C. P. (+353), N.-W. F. P. (+110) and Assam (+8). In Andamans the average strength of 5,351 compared favourably with 5,759 during 1934 and 7,088 the quinquennial mean.

Table X (*i*) gives the authorised accommodation, the daily average population and the maximum population confined on any one day in jails and subjails during 1934 and 1935.

TABLE X (*i*).

	Authorised accommodation excluding hospitals and observation cells.		Daily average population.		Maximum number confined on any one day.	
	1935.	1934.	1935.	1934.	1935.	1934.
N.-W. F. P.	**5,367**	5,024	**6,668**	6,351	**7,438**	7,260
Punjab	**15,013**	15,013	**21,992**	21,849	**25,720**	26,370
U. P.	**32,112**	32,053	**31,659**	31,925	**32,318**	32,650
B. & O.	**13,964**	13,730	**12,549**	12,431	**17,503**	18,988
Bengal	**17,220**	18,304	**22,724**	21,851	**30,266**	28,969
C. P.	**6,518**	6,518	**5,162**	4,793	**6,404**	5,924
Bombay	**19,389**	19,275	**13,739**	14,510	**21,302**	22,647
Madras	**20,129**	20,123	**16,375**	14,959	***14,931**	13,466
Assam	**3,579**	3,581	**4,014**	4,009	†	4,818
Burma	**20,993**	20,362	**20,434**	20,477	†	22,525

*Exclusive of sub-jails. †Not available.

NOTE—The statistics in paras. 128 to 144 relate to all classes of prisoners in the central and district jails; those in para. 145 and particularly the figures of sickness and mortality in para. 146 to convicts only.

Abbreviations :—

p.m.—*per mille.*

I. G. of P.—Inspector General of Prisons.

C. S. fever—Cerebrospinal fever.

P. U. O.—Pyrexia of uncertain origin.

129. The constantly sick rate, exclusive of Andamans, rose slightly from 21 p. m. in 1934 to 22 p. m., but was still less than the quinquennial average (23 p. m.). Provinces showing increases included U. P., Madras, Assam and Burma ; in other provinces the rate was the same as or lower than that of 1934.

130. Excluding the Andamans, the " admission to hospital rate " further dropped to 497 p. m. ; the figure for the quinquennial mean being 586 p. m. In N.-W. F. P., Punjab, B. & O., C. P., Bombay, Assam and Burma the rate was below both that for 1934 and the mean. Bengal, with its overcrowded jails, again returned the highest rate, *viz.*, 1,046 p. m. whilst the lowest admission rate was reported in Burma 146 p. m. The Andamans recorded the higher rate of 651 p. m. but this compares well with 738 p. m. the quinquennial mean.

131. In India proper (excluding Andamans) the death rate fell from 12 p. m. in 1934 to 11 p. m. Death rates were lower than in 1934 in B. & O., C. P., N.-W. F. P., Bombay, U. P., Bengal, Punjab and Madras ; higher in Assam and Burma. In Assam the high death rate, which exceeded that for 1934 by 8 p. m. was ascribed to increased incidence of malaria, pneumonia and anaemia and debility ; in Burma to an increase in the number of admissions in a poor state of health.

Causes of Sickness and Mortality.

132. The principal recorded causes of sickness and mortality, exclusive of the Andamans, are given in Tables X (*ii*) and X (*iii*). The variations require no comment.

TABLE X (*ii*).

	1934.		1935.	
	Admissions.	Rate p. m.	Admissions.	Rate p. m.
Malaria	21,622	152	19,683	137
Abscess, ulcer and boil	4,982	35	5,429	38
Dysentery	4,746	33	4,239	30
Influenza	5,667	40	3,937	27
Respiratory diseases*	4,329	31	3,596	25
Diarrhœa	2,834	20	2,894	20
Pneumonia	1,614	11	1,431	10
Anaemia and debility	1,089	8	1,057	7
Pyrexia of uncertain origin	1,132	8	1,000	7
Tubercle of the lungs	831	6	789	5
Sandfly fever	406	3	289	2
Enteric fever	243	2	278	2
C. S. fever	130	1	96	1

*Excluding tubercle of the lungs and pneumonia.

TABLE X (*iii*).

	1934.		1935.	
	Deaths.	Rate p. m.	Deaths.	Rate p. m.
Pneumonia	392	2·8	292	2·0
Tubercle of the lungs	308	2·2	310	2·2
Dysentery	112	0·8	100	0·7
Malaria	82	0·6	71	0·5
C. S. fever	78	0·6	60	0·4
Respiratory diseases*	70	0·5	46	0·3
Anaemia and debility	46	0·3	43	0·3
Enteric fever	41	0·3	37	0·3

133. *C. S. Fever.*—There were 96 cases with 60 deaths as against 130 and 78 in 1934. Of these 29 cases and 19 deaths were recorded in the Punjab jails; 17 and 9 in U. P.; 16 and 8 in B. & O.; 13 and 13 in Bombay Presidency; 8 and 4 in Bengal; 7 and 2 in N.-W. F. P.; 3 and 3 in Delhi; 2 and 1 in C. P. and 1 fatal case in Burma.

134. *Influenza.*—Bengal Presidency as usual suffered most with 2,297 admissions; U. P. recorded 582 admissions; Madras 313; Burma 276; and B. & O. 240. Admission rates for 1935 are in every province lower than those for 1934.

135. *Cholera.*—The number of cases decreased from 35 in 1934 to 18 and the deaths from 7 in 1934 to 5 this year. These comprised 13 cases with 3 deaths in the U. P., 3 and 1 in Bengal and 2 and 1 in Burma.

136. *Small-pox.*—59 admissions with 3 deaths were reported as against 54 and 1 respectively in 1934. The U. P. recorded 41 cases with 2 deaths, Bengal 6 cases and 1 death, Punjab 5 cases, C. P. and Bombay 2 cases each. and Delhi, Madras and Burma 1 case each.

137. *Plague.*—Except for six fatal cases in Burma jails, this disease was absent.

138. *Enteric fever.*—Of 278 admissions with 37 deaths, 85 and 10 occurred in the Punjab, 35 and 6 in Burma, 33 and 4 in N.-W. F. P., 25 and 4 in Bengal, 24 and 1 in U. P., 22 and 5 in Bombay, 19 and 4 in Madras, 13 non-fatal cases in B. & O., 10 and 3 in Assam, 4 each in C. P., and Ajmer, and 1 each in Quetta, Secunderabad, Mercara and Delhi.

139. *Kala Azar.*—Admissions from this cause numbered 285 with 15 deaths of which 198 and 5 respectively were recorded in Bengal, 73 and 7 in B. & O., 7 and 2 in Assam and 7 and 1 in U. P.

140. *Dysentery.*—Bengal again headed the list with 1,318 admissions and 21 deaths, B. & O. recorded 517 cases and 10 deaths, Madras 505 and 9, Bombay 437 and 10, Assam 386 and 15, U. P. 360 and 5, and Punjab 246 and 11. In N.-W. F. P., Punjab, U. P., Bombay, Assam and Burma the admission rate was lower than that for 1934 and the quinquennial mean; whilst in Bengal the admission rate, though higher than the quinquennial average, was still below that for 1934.

141. *Diarrhœa.*—Bengal recorded 1,497 admissions, or nearly 52% of the total, as against 1,211 admissions in 1934. The figures in the U. P. (419), Bombay (267) and Punjab (231) are also worthy of note.

*Excluding pneumonia and tubercle of the lungs.

Table X (*iv*) gives combined figures for dysentery and diarrhœa.

TABLE X (*iv*).

	Admission rate p. m.			Death rate p. m.		
	Mean 1930-34.	1934.	1935.	Mean 1930-34.	1934.	1935.
India	**59**	**52**	**50**	**1**	**1**	**1**
N.-W. F. P.	24	18	11	..	..	..
Punjab	53	48	24	1	1	1
U. P.	35	30	24	1	1	..
B. & O.	111	64	66	2	2	1
Bengal	119	129	139	2	2	1
C. P.	71	50	62	2	2	1
Bombay	86	83	61	1	..	1
Madras	50	38	42	1	2	1
Assam.	142	110	111	3	2	4
Burma	23	12	11	2	1	1
Andamans	32	32	49	5	1	1

142. *Malaria.*—The incidence of malaria was lower than in 1934 and was 10% less than the quinquennial mean. All provinces shared in the decrease except U. P. and Assam where admission rates were 153 p. m. and 140 p. m. as against 127 p. m. and 111 p. m. during the previous year. The Andamans reported a rate of 253 p. m. as compared with 260 p. m. in 1934 and 380 p. m. the mean.

Burma, Madras Presidency, C. P. and B. & O. continued to record the lowest incidences.

The malaria death rate was highest in the Andamans (1·3 p. m.), Assam (1·2 p. m.) and Bengal (0·9 p. m.). In other provinces the rates varied between 0·8 p. m. in B. & O. and 0·2 p. m. in C. P., Madras and Burma.

143. *Pneumonia.*—269 admissions and 55 deaths were registered in Bengal, 263 and 64 respectively in U. P., 159 and 26 in the Punjab, 144 and 22 in Bombay, 140 and 22 in B. & O., 106 and 18 in N.-W. F. P., 103 and 23 in Assam, 98 and 31 in Burma, 86 and 13 in Madras and 33 and 10 in C. P.

The highest admission rate was recorded in Assam (26 p. m.), the rate in N.-W. F. P. was 16 p. m., in B. & O. 14 p. m. and in Bengal and Bombay 13 p. m.

The highest mortality rate was recorded in Assam (5·7 p. m.). Other provincial rates were N.-W. F. P. and Bengal (2·7 p. m.), B. & O. and C. P. (2·2 p. m.), U. P. and Bombay (2·0 p. m.), Burma (1·5 p. m.) and Madras Presidency (1·0 p. m.).

144. *Tubercle of the lungs.*—Excluding the Andamans, the number of admissions (789) was below that for the previous year (831) and for the quinquennium (938), whilst the number of deaths (310) was higher than that of 1934 and the quinquennial mean.

Admission and death rates for individual provinces will be found in Appendix IX, Table A.

Accommodation provided for the segregation and treatment of tubercular patients was as follows :—

N.-W. F. P.—Abbottabad jail has a ward containing 40 beds.

Punjab.—As in 1934 most tubercular prisoners were concentrated in the Multan New Central Jail (138 beds). Montgomery Central Jail had a special tuberculosis ward of 12 beds and Rawalpindi District of 8 beds.

U. P.—Sultanpur jail (148 beds).

B. & O.—Arrangements for housing tubercular cases exist at Bhagalpur (35 beds), Buxar (12 beds) and Gaya Central (6 beds) Jails. The District Jail at Purulia also provides 4 beds.

Bengal.—Suri Jail has accommodation for 34 cases and Comilla Jail for 40. Besides this, Dacca Central Jail (10 beds), Midnapore (10), Rajshahi (2), Alipore (8) and Presidency Jail (10) have accommodation for treatment and segregation of cases of tuberculosis for short termers and such of them who cannot travel.

C. P.—Chhindwara Jail (22 beds).

Bombay Presidency.—Special provision exists in the Central Jails at Belgaum (18 beds), Yeravda (8 beds), Ahmedabad (6 cells) and Hyderabad (3 cells) and in the Karachi District Jail (3 beds).

Madras Presidency.—Wellesley Sanatorium Jail, Bellary, is set apart solely for the treatment and segregation of prisoners suffering from tuberculosis and has accommodation for 160 patients.

Assam.—Sylhet Jail (23 beds).

Burma.—The Myingyan Jail has a tubercular ward with 50 beds. Accommodation is also provided at Rangoon and Insein (20 beds each), Myaungmya (8 beds), Thayetmyo and Moulmein (5 beds each), Akyab, Tharrawaddy, Bassein and Toungoo (4 beds each), Henzada (3 beds) and Mandalay (2 beds).

Weight of Prisoners.

145. Table X (*v*) shows in percentages the condition of prisoners on discharge in the different provinces. The table is arranged in the order of loss of weight :—

TABLE X (*v*).

Provinces.	Gained weight.	Stationary.	Lost weight.
Aden	45	27	28
Andamans	50	24	26
Bombay	52	26	22
Burma	60	25	15
B. & O.	59	27	14
Assam	54	32	14
Bengal	50	37	13
U. P.	58	32	10
C. P.	62	29	9
Punjab	40	51	9
Coorg	79	12	9
N.-W. F. P.	49	43	8
Madras	67	25	8

In the Punjab, U. P., and N.-W. F. P. 70%, 87% and 87% respectively of the prisoners released were reported to be in good health, 29%, 11% and 12% in indifferent and 1% in each in bad health. These figures compare well with the conditions of health recorded on admission to jails, *viz.*, 66%, 82% and 83% in good, 33%, 17% and 15% in indifferent and 1%, 2% and 2% in bad health.

In the Madras Presidency, the largest percentages of prisoners who lost weight were recorded in Salem (26%), and in Vizagapatam (21%).

Special remarks on provinces.

146. *N.-W. F. P.*—Jails numbered eight and lock-ups seven. The daily average strength rose to 7,094 (7,004 males and 90 females), but despite overcrowding, the year was a fairly healthy one.

30 prisoners were released on medical grounds. The number of hospital admissions decreased from 2,867 to 2,443 and deaths also decreased from 91 to 67. The daily average sick rate fell to 25 p. m., males 25 and females 34 p. m. The hospital admission rate for females (1,068) was once more over twice the rate for males (418).

Of the 67 deaths, 24 were due to pulmonary tuberculosis, 16 to pneumonia, 3 to malaria, 3 to other tubercular diseases, 1 to diarrhœa and 20 to other causes.

The Adolescents Training Centre at Haripur did excellent work during the year.

The chief works carried out during the year included, *inter alia*, the construction of a new ward for the treatment of sick prisoners in Charsadda Sub-jail.

Dietary charges per head further fell to Rs. 29-6-4, whilst hospital charges clothing and bedding charges and sanitation charges increased to Rs. 236-15-0, Rs. 11-15-0 and Rs. 1-6-10, respectively.

Punjab.—Excluding hospitals and observation cells, accommodation was provided in 4 Central Jails, 1 Borstal, 17 District, 2 Camp, one special and 11 sub-jails for 14,367 male and 646 female prisoners. The daily average strength for all classes of prisoners rose to 21,992 (males 21,695 and females 297), and the maximum population confined on any one day was 25,720 (25,355 males and 365 females).

Overcrowding was still acute and if the proposals to erect a new jail near Amritsar and to enlarge the District Jails of Hissar and Mianwali are accepted, much needed relief will be given. Works of importance executed during the year included :—

1. Construction of forty cells and the remodelling of a barrack in the Multan Old Central Jail.
2. Construction of twenty cells in the Dera Ghazi Khan Jail.
3. Improvements to the water supply at Hoshiarpur Jail.

During the year health conditions were good. Admissions to hospital (12,790), daily average sick (445) and total deaths (218) were all lower than those of 1934. The death rate of less than 10 p. m. was the lowest on record. The New Central Jail, Multan, recorded the highest mortality rate, *viz.*, 32 against 46 in 1934.

Whilst malaria continued to be the chief cause of sickness and tuberculosis and pneumonia were the most important causes of death, there was a general decrease in the incidence of malaria, pneumonia and dysentery.

The total of 3,751 admissions and 7 deaths compare favourably with 5,272 and 27 respectively for the previous year. Tuberculosis accounted for 194 admissions and 72 deaths, of which 47 occurred in the special ward attached to the New Central Jail, Multan, and 6 in the Lahore Central Jail. Pneumonia was responsible for 155 admissions and 26 deaths.

C. S. fever was the cause of 29 admissions and 19 deaths of which 12 occurred in the Borstal Institution. Dysentery accounted for 215 admissions and 11 deaths ; Multan Central Jail and Lahore District Jail admitted 68 and 23 cases respectively.

28 prisoners developed mental disease of which 7 were transferred to the Mental Hospital. 10 old and 2 new leprous patients were treated in the special ward attached to the District Jail, Mianwali ; 3 were released during the year.

Dietary charges increased from Rs. 22-10-7 to Rs. 27-7-11 per head ; clothing and bedding and sanitation charges dropped from Rs. 7-7-6 and Rs. 2-14-2 to Rs. 6-8-2 and Rs. 2-4-9 per head. Hospital charges rose from Rs. 419-14-6 to Rs. 503-14-5 per head.

U. P.—The daily average jail population declined from 31,925 in the previous year to 31,659. The total available accommodation for all classes of prisoners was sufficient for 30,657 males and 1,455 females. The maximum population on any one day was 32,318 as compared with 32,650 in the year 1934.

The improvement in health conditions recorded in the previous years was well maintained. Both admissions to hospital 15,431, with a rate of 487 p. m. and daily average sick, *viz.*, 684 or 22 p. m. rose slightly. The death rate (7·5 p. m.) recorded this year was with one exception, the lowest during the past decade.

The main causes of sickness were malaria 4,120 admissions ; abscesses, boils and ulcers 1,914 ; other respiratory diseases 792 ; diarrhœa 354; dysentery 273 ; pneumonia 218 ; anaemia and debility 118 ; tuberculosis 108 ; and cholera 12. Nine prisoners died of c. s. meningitis. Pneumonia (57) and tuberculosis (36) accounted for nearly 39% of all deaths ; other respiratory diseases caused 12 deaths, malaria 8, dysentery 5, abscess, boils and ulcers 5, anaemia and debility 4, cholera 2 and diarrhœa 1. Plague was absent.

Several important changes were made to improve conditions. These included the replacing of iron by brass utensils, the supply of mustard cakes for washing purposes, the supply of an additional blanket to old and convalescent prisoners during the cold months, the supply of rice-cakes and the supply of an additional bi-weekly paper to A and B class prisoners.

Leprosy cases, as usual, were concentrated in the Rae Bareli Jail. Old and new cases numbered 83 and 90 respectively.

Dietary charges rose to Rs. 27-15-1 ; hospital charges fell to Rs. 93-8-9 per head.

Sanitary charges fell from Rs. 1-10-5 to Rs. 1-8-0 whilst the cost of clothing and bedding rose from Rs. 3-0-6 to Rs. 3-5-8.

B. & O.—Excluding hospitals and observation cells accommodation was available for 12,385 convicts, 1,461 under-trials and 118 civil prisoners. The number of central (4) and district (12) jails remained the same as in the previous year, whilst subsidiary jails decreased from 50 to 49. The Juvenile Jail at Monghyr which had been seriously damaged by the earthquake was under reconstruction, and the prisoners were temporarily housed in the Hazaribagh Central Jail. To relieve the great congestion in the permanent jails the reduced jails at Arrah, Chaibassa, Balasore and Daltonganj continued to function as district jails.

The daily average number of prisoners of all classes rose from 12,431 in 1934 to 12,549.

Despite acute over-crowding, the general health was satisfactory in every respect. Total admissions to hospital, and daily average number of sick both fell from 5,241 and 284 in 1934 to 4,720 and 265 respectively. Total deaths from all causes and the death rate *per mille* also fell from 230 and 18·5 in 1934 to 211 and 16·8 respectively. The Central Jails at Bhagalpur (61), Buxar (28) and Gaya (23) and the District Jail at Purnea (15) returned the largest numbers of deaths. In Darbhanga District Jail there were no deaths. The highest death rate was recorded at Dumka (46·2 p. m.). Other high death rates were Purnea (44·3), Sambalpur (30·8), Bhagalpur (27·4) and Bankipur (18·9).

Cholera was absent.

C. S. fever accounted for 17 cases and 8 deaths, of which 11 sporadic cases with 5 deaths occurred at the Bhagalpur Central Jail. 5 cases with 3 deaths occurred at the Gaya Central Jail during the earlier part of the year these being in continuation of the outbreak of the previous year. There were 536 cases and 12 deaths from dysentery. Malaria was responsible for 458 cases and 8 deaths and influenza for 245 and 7 respectively. Pneumonia was responsible for 129 cases and 24 deaths, diarrhœa for 172 cases, abscesses, boils, etc., for 174 cases and other respiratory diseases for 342 and 4 respectively.

Ankylostomiasis caused 397 admissions and 30 deaths. The Central Jail at Bhagalpur alone recorded 76 cases and 14 deaths. Of the 17,793 prisoners examined 7,687 were found infected.

The number of admissions from pulmonary tuberculosis fell from 108 to 81, whilst the deaths increased from 38 to 43. Anaemia and debility caused 34 cases and one death.

Leprosy cases were, as usual, segregated in the Muzaffarpur District Jail. The daily average number of lepers was 48.

53 non-criminal mental cases were sent to jails for observation. Criminal lunatics are transferred temporarily to the Central Jail at Hazaribagh where they are detained until accommodation is available in the Mental Hospital at Ranchi. It is undesirable to detain mental cases for an indefinite period in jail, and the Government have under consideration the advisability of relaxing existing rules in order to enable the Indian Mental Hospital to admit patients up to a certain percentage over the registered capacity of that hospital.

Dietary charges and hospital charges rose to Rs. 33-15 and Rs. 4-9 respectively, whilst expenditure per head on clothing and bedding fell to Rs. 4-11 ; sanitation charges were as before Rs. 1-14.

Bengal Presidency.—Serious overcrowding continued to exist in all ails throughout the year, in regard to both convict and under-trial prisoners. In order to provide some relief, the two special jails at Dum Dum, the additional special jail at Hijli and the special jail at Berhampore were utilised throughout the year. Excluding hospitals and observation cells, accommodation existed for 17,220 prisoners (16,564 males and 656 females). The daily average population rose to 22,724 (22,468 males and 256 females), this figure being the highest in the last 10 years except for 1932. The daily average convict population rose to 18,129 (17,929 males and 199 females).

A heavy flood in the Damodar river in mid-August 1935, inundated the whole area of the Burdwan Jail. Prisoners had to be kept on the roofs of the workshops for more than 24 hours.

The reconstruction of the perimeter wall in the lower portion of the Darjeeling Jail and the construction of 2 new barracks were completed.

Sickness rates were slightly higher, but mortality was considerably lower than in 1934. The daily average sick rose from 789 to 808, though the ratio *per mille* fell from 36 p. m. to 35·6 p. m., and the number of deaths from 282 (13 p. m.) to 240 (11 p. m.). The general health of prisoners remained fairly good, the rise in the daily average sick being probably due to the poor health of new admissions. The death rates for individual jails varied from 20 in Darjeeling to 7 in Berhampore.

Epidemic dropsy was responsible for 22 cases of which 14 were treated in the Dum Dum Special Jail B ; all recovered. There were eight cases of c. s. meningitis with four deaths ; of these 6 occurred at the 2 Dum Dum Special Jails.

Dysentery, malaria, pneumonia and pulmonary tuberculosis were the chief causes of mortality.

The manufacturing section of the Presidency Jail continued to meet the increased demand for cinchona and quinine and issued 43,081 lbs. of these drugs in addition to 80,032 boxes of quinine.

The Bengal After-Care Association and its district ramifications continued their useful work. The Claude Martin Fund distributed Rs. 1,871 amongst the 1,884 released prisoners.

Dietary and sanitation charges per head, and hospital charges per head of average sick rose from Rs. 39-12, Rs. 2-15 and Rs. 200-7 to Rs. 41-2, Rs. 3-7 and Rs. 203-7 respectively ; whilst expenditure on clothing and bedding of prisoners fell from Rs. 4-12 to Rs. 4-3.

Total expenditure on jail buildings amounted to Rs. 4,22,167 of which Rs. 1,43,794 were spent on original works.

C. P. and Berar.—There was no change in the number and classification of jails. Accommodation existed for 6,076 males and 442 females. The daily average jail population rose from 4,793 in 1934 to 5,162 and the number of convicted persons rose from 6,990 to 8,077, the maximum numbers confined on any one day being 6,135. The number of prisoners sentenced under the Borstal Act was 122.

The year was a healthy one. Admissions to hospital (1,138 or 222 p.m.), daily average sick (42 or 8 p.m.), and deaths (55 or 11 p.m.) all were lower than the figures of the previous year.

Cholera was conspicuous by its absence. Malaria (205 cases), diarrhœa (113) and dysentery (176) were the chief causes of sickness. There were 62 admissions for abscesses, boils and ulcers, 42 for pneumonia, 29 for anaemia and debility, 14 for tuberculosis of the lungs and 5 for other tubercular diseases. Of the total deaths, pneumonia was the cause in 12, tuberculosis in 6 and dysentery in 5.

The Nagpur Central Jail continued to meet the steady increase in demand for quinine and cinchona. Quantities issued during the year are given below :—

	1933.	1934.	1935.
	lbs.	lbs.	lbs.
Quinine sulphate . . .	641	652	683
Cinchona febrifuge . . .	619	558	533
Quinine hydrochloride . . .	29	25	38
Quinine tablets . . .	346	292	384
Cinchona tablets	185	184	195
Quinine boxes	2,965	3,176	3,832

The Discharged Prisoners Aid Societies at Nagpur, Amraoti and Bilaspur rendered useful service by providing, wherever possible, released prisoners with work.

Dietary and hospital charges rose to Rs. 25-3-7 and Rs. 537-8-5 respectively, and clothing and bedding and sanitation charges to Rs. 8-9-1 and Rs. 3-1-11 respectively.

Bombay Presidency.—Statistics for the Borstal School have been dealt with separately at the end of this paragraph.

Owing to continuous rain in January, 1935, and the rise in the subsoil water, the jail buildings and walls of the Special Prison at Shikarpur were seriously damaged. Owing to the danger to the life of the inmates, this jail was abandoned after the close of the year.

The Visapur Prison was continued on a temporary basis. Since the close of the year, it has however been designated as " The Government Prisoner Farm, Visapur ", and convicts are trained in modern agricultural and farming methods, dairying and poultry farming.

Proposals have been submitted to Government for the housing of all criminal lunatics and un-certifiable criminal mental defectives in the District Prison at Bijapur on the lines of " Broadmoor " in England, with special staff for the care and treatment of these cases. Another scheme for the conversion of the old District Prison at Ratnagiri into a " Reception Borstal School " was also under consideration.

Excluding hospitals and observation cells accommodation existed for 18,992 prisoners (16,239 males and 2,753 females) as compared with 18,878 (16,135 males and 2,743 females) in 1934. The daily average strength was 13,348 (13,095 males and 253 females), whilst the maximum number confined on any one day was 20,882 (20,102 males and 780 females).

This year overcrowding was not so acute as in 1934 the daily average population exceeding authorised accommodation only in Hyderabad Central and Sukkur District Prisons.

The number of adolescents admitted between the ages of 15 and 21 decreased to 1,628 (1,542 males and 86 females).

Admissions to hospital (8,548), daily average number sick (263), constantly sick rate per 1,000 (20), total number of deaths (158) and the death rate per 1,000 (12) were all lower than the corresponding figures for 1934. The highest death rate (20 p.m.) was once again recorded in Shikarpur Special Prison.

Plague was entirely absent and only one case of cholera was recorded.

C. S. fever accounted for 12 admissions and 12 deaths, *viz.*, Visapur Temporary Prison (5), Hyderabad Central Prison (1), Shikarpur Special Prison (1) and Sind Convict Gang (5). The sources of infection could not be traced.

The following cases of infectious or deficiency diseases were reported during the year—mumps 127, influenza 40, chicken-pox 19, small-pox 2, scurvy 8 and enteric group 22 (with 5 deaths).

Dysentery and diarrhœa caused 644 admissions and 12 deaths, tuberculosis 59 admissions and 18 deaths, malaria 2,686 admissions and 4 deaths and pneumonia 141 admissions and 22 deaths.

Five cases were released on medical grounds.

Of the 28 convict boys who appeared for the First-Aid Examination 27 passed.

The Discharged Prisoners Aid Societies at Bombay, Ahmedabad, Belgaum and Bijapur continued to work usefully.

13 male and 2 female prisoners were transferred to Mental Hospitals.

Dieting, hospital, clothing and bedding and sanitation rates all increased, these being Rs. 37-8-9, Rs. 116-6-4, Rs. 3-7-0 and Rs. 5-13-4 respectively.

Borstal.—The Bombay Act XVII of 1935 has raised the detention period from 2 to 3 years.

Excluding hospitals and observation cells accommodation existed for 397 prisoners ; daily average strength was 391 and maximum number confined on any one day 420.

There were 148 admissions to hospital with 1 death. Of these 63 cases were due to malaria, 15 to abscesses, boils and ulcers, 8 to diarrhœa, 6 to "other respiratory diseases", 3 to dysentery and 13 to "other infective diseases".

The revised scale of diet which was sanctioned on March 1, 1935, has been continued. Dieting, hospital, clothing and bedding and sanitation charges were Rs. 30-2-5, Rs. 192-11-3, Rs. 4-5-3 and Rs. 5-7-5 respectively.

Madras Presidency.—Nine Central, 3 District, 2 Borstal, 3 Special and 310 Sub-jails provided accommodation for 20,129 prisoners (18,420 males and 1,709 females). The daily average population of all classes rose to 16,004 males and 371 females and that of convicts to 12,356 and 309 respectively. 18 convicts were released on medical grounds. Other releases included 3 females convicted of infanticide ; these were placed under the care of the Madras Seva Sadan.

Adolescents detained in Borstal schools at Tanjore and Palamcottah numbered 1,004.

Ambulance and First-Aid training was provided as usual ; 33 of the 763 new admissions were awarded certificates.

Admissions to hospital and daily average number of sick rose to 4,871 (297 p.m.) and 235 (14 p.m.) respectively. The female admission rate (431 p.m.) continued to be in excess of that for males (294 p.m.). Total deaths

further rose to 178 although the death rate (11 p.m.) was the same as in 1934. Of the total deaths, 145 occurred among convicts, 29 among under-trials and 4 among civil prisoners; 28 occurred in Rajahmundry; 25 in Trichinopoly; 24 in Vellore; 19 in Coimbatore; 11 in Vizagapatam; 7 each in Penitentiary, Madras and the Central Jail, Cannanore; 5 each in Salem, Cuddalore and Madura and 3 each in Behrampur and the Vellore Presidency Jail for Women and 2 in Bellary.

Cholera was again absent. The number of admissions from dysentery rose from 388 to 477, but deaths fell from 12 to 9. 124 cases were admitted into the Cannanore Jail alone, 61 in Trichinopoly and 59 in Bellary. The number of admissions due to malaria rose from 196 to 214, but only 2 deaths were recorded. The highest number of admissions 78 was reported by the Bellary Jail.

Tuberculosis continued widespread in all jails except at Salem, Berhampur and Tanjore and Palamcottah Borstal schools. Deaths fell from 22 to 15 notwithstanding the fact that the number of admissions rose from 57 to 59.

Both admissions and deaths from anaemia and debility fell from 78 and 6 to 57 and 2 respectively. Rajahmundry (17) recorded the highest number of admissions. Only 2 deaths occurred, 1 at Rajahmundry and the other at Salem.

A considerable increase occurred in the number of admissions, 33 to 76, from pneumonia, but the number of deaths (12) was the same. Diarrhœa and syphilis each accounted for 24 admissions and 1 death, enteric fever 18 and 3, and ankylostomiasis 10 and 1 respectively.

The mental defectives' section of the Cuddalore Jail accommodated 93 prisoners, of which 4 were transferred to the Mental Hospital at Madras; the Leper Annexe of the Salem Central Jail had 152 prisoners.

With the exception of the Jails at Trichinopoly, Madras, Bellary, Vizagapatam, Madura and Berhampur, which are linked with the municipal water pipe connection, all other jails in the Presidency obtained their water-supply from properly constructed and protected wells.

Of the 32,642 prisoners released during the year, 902 were helped by the Discharged Prisoners' Aid Society.

Dietary, hospital and sanitation charges further dropped to Rs. 33-11-9, Rs. 2-9-4 and Rs. 3-6-7, but clothing and bedding charges rose to Rs. 5-6-11.

Assam—Available accommodation provided for 3,954 prisoners.

The daily average population (4,014) was the highest on record including 3,406 convicts, 603 undertrials and five civil prisoners.

Overcrowding continued to exist and the necessity for additional accommodation remained acute.

Hospital admissions fell from 2,122 to 1,992 and the admission rate p.m. from 529 to 496. Daily average sick rose from 87 to 93 and deaths and death rate from 58 and 14·5 p. m. to 87 and 21·7 p. m. respectively. 81 deaths occurred among convicts and six among undertrials.

In the Assam Valley andSurma Valley Jails the percentage of habitual drug-takers among convicts was 32·1 and 6·5 respectively.

8 Prisoners were transferred to the mental hospital.

Malaria (489 admissions) and dysentery (312 admissions) continued to be the main causes of sickness ; 21 deaths were ascribed to pneumonia, 15 to dysentery, 11 to pulmonary tuberculosis and five to malaria.

The incidence of dysentery was again highest in Gauhati (114 cases) and malaria in Sylhet (136 cases).

Cases infected with hook-worm were, as usual, given suitable treatment ; of the 3,603 prisoners examined, 577 were found infected.

Dietary charges per head rose to Rs. 34-8-3 and cost per head of average sick fell to Rs. 183-6-4.

Expenditure on clothing and bedding and sanitation rose to Rs. 20,965 and Rs. 2,925 respectively.

Assistance was given to ex-convicts by the Discharged Prisoners' Aid Society founded in 1934.

Burma.—Excluding hospitals and observation cells, accommodation existed for 20,993 prisoners (20,682 males and 311 females). The Alôn Camp Jail was reopened on 24th January, 1935 and District Jail at Monywa was then reduced to the status of a subsidiary jail. At the close of the year there were thus 9 central, 17 district, 2 camp and 5 subsidiary jails or a total of 33, as against 32 in the previous year. The structural alterations to the old Reformatory School Buildings were completed during the year, and the subsidiary jails at Pegu and Pyapon, hitherto under the supervision of the Police Department, were brought under the general control of the Inspector General of Prisons. The combined Borstal and Senior Training School at Thayetmyo continued to function.

Daily average population was 20,434 (20,226 males and 208 females) so that no over-crowding existed. Of the prisoners discharged, 29 were released on medical grounds and 11 were sent to the Mental Hospital.

The year was fairly healthy. Admissions to hospital further dropped from 3,668 to 2,949, but the daily average sick rose to 225 and deaths to 221. The admission rate was 144 p. m., the daily average sick 11 p. m. and death rate 11 p. m., as against 179, 10 and 10 p. m. respectively during 1934. 200 deaths occurred among convicts, 20 among undertrials and 1 of a civil prisoner.

One death was recorded from cholera and 5 from plague. Partly because of effective chlorination of water-supplies, admissions from dysentery fell from 180 to 152 ; dysentery deaths increased from 12 to 14.

Tuberculosis was responsible for 122 admissions and 63 deaths. In the special ward at Myingyan 90 cases, including 46 new admissions, were treated and of these 13 died. Four cases were discharged cured.

Anaemia and debility accounted for 44 admissions and 5 deaths ; enteric fever 37 and 6 ; beri-beri 8 and nil ; and influenza 289 with no death.

Nearly 5 % of the convict population were opium addicts.

Important works executed during the year included :—

1. Installation of a new well at Rangoon Jail.
2. The Rangoon Jail was connected with the Rangoon Corporation water supply system as a precautionery measure in case of emergency.
3. Wooden covers were provided for wells in the Insein Jail Annexe.
4. Pipe connections were installed at the Shwebo Jail for bringing water from Moksogyon Branch Canal.

The Burma Prisoners' Aid Society did useful work among released prisoners.

First-aid classes were held in 10 jails, but the courses could be completed only in 8. Training was given to 8 jailors, 11 cadet jailors, 20 warders and 111 prisoners, of whom 8, 11, 10 and 91 respectively passed the prescribed test.

Dietary, clothing and bedding and sanitation charges all increased during the year, whilst hospital charges decreased. The restricted issue of clothing introduced as a measure of retrenchment having failed, reversion to the old scale was sanctioned.

Andamans.—The daily average population numbered 5,288 males and 63 females as against 5,679 males and 80 females in 1934. Allowing 50 superficial feet per prisoner, barracks and cells had accommodation for 4,309 (4,249 males and 60 females). The maximum population confined on any one day was 5,512 (5,442 males and 70 females).

3,484 convicts were admitted to hospital and 52 deaths were recorded as against 3,268 admissions and 83 deaths in 1934. The daily average number of sick was 242 as against 156.

The general health of the settlement was good throughout the year inspite of the fact that total admissions to hospital and daily average sick were higher as compared with the rates for 1934. This was due to the fact that anaemic prisoners and those with enlarged spleens were sent to hospital for treatment.

Energetic anti-malarial campaign lowered the incidence of and mortality from malaria, the figures being 1,353 and 7 respectively.

Tuberculosis was responsible for 15 admissions and 8 deaths and pneumonia for 18 and 4. There were 128 admissions for respiratory diseases. Dysentery caused 210 admissions and 3 deaths.

Weil's disease caused 13 admissions and 3 deaths ; influenza 64 admissions ; and anaemia 36 admissions with 3 deaths.

During the last two months of the year under report, 18 cases of epidemic dropsy occurred. Effective measures were speedily taken to stamp out the epidemic.

Two imported small-pox cases occurred amongst the free population. 578 persons were vaccinated.

Village water supplies are still unsatisfactory. The supply of milk improved during the year.

Aerated water factories, tea shops, public eating houses, bakeries, sweetmeat stalls, slaughter of animals and the sale of meat are now regulated by rules introduced during the year.

Half-yearly medical inspection of the school children continued.

All ships were inspected immediately on arrival. Passengers leaving the settlement were medically inspected before embarkation.

An Annexe to the Indian Women and Children's Hospital at Altlanta Point is under construction.

Aden and Coorg.—No detailed comment is necessary.

Conclusion.

147. The health of the jail population was generally good throughout the year under review. The general death rate fell to 11 p. m. which is one p. m. lower than the average figure for the past five years. The marked decrease in the death rate in the Andamans, which was the subject of favourable comment in last year's report, has been followed by a further small decrease, so that the figure for this area is now below the average of the total jail population in India. Although one cannot make too much of this comparison in the absence of age-constitution figures, nevertheless this low death rate indicates a satisfactory state of affairs. Assam is the only province to record a considerable variation in the death rate, but the constantly sick rate in this province does not indicate any great change, so that further comment is unnecessary.

Malaria and dysentery admissions continue to diminish satisfactorily, the former from 21,622 to 19,683 and the latter from 4,746 to 4,239. Figures for tuberculosis of the lungs remain about the same level and this infectious disease must remain a source of anxiety to jail medical officers.

It is apparent that medical administration has been maintained at a satisfactory level of efficiency.

SECTION XI.

INDIAN VOLUNTARY HEALTH ORGANISATIONS.

The Indian Red Cross Society*.

148. The year 1935 will remain a memorable one in the history of this Society for two events which will be re-called with emotions of a widely different character. The first was Their Majesties' Silver Jubilee and the second the Quetta Earthquake.

On May 6th the Silver Jubilee of Their Majesties' the King-Emperor and the Queen-Empress was celebrated with great public rejoicings throughout India. To mark the occasion, His Excellency the Viceroy inaugurated a Silver Jubilee Fund " for the relief of sickness and suffering throughout India ". This Fund reached the splendid total of over 138 lakhs of rupees, a striking tribute to the efforts of Her Excellency the President and to the generosity of the princes and peoples of India. By His Majesty's wish, the proceeds were divided among four leading charitable organisations, of which this Society was one. The greater portion (70%) has been returned to the provinces for distribution, while 30% has been allotted to headquarters. The total allocation to Indian Red Cross headquarters was Rs. 18,57,000 at the end of 1935. All Red Cross activities will benefit greatly by this munificent and timely assistance, which has effectively dispelled the financial gloom referred to in the 1934 report.

The second event was the Quetta earthquake, which destroyed the capital of Baluchistan in the early hours of May 31st, killing about 20,000 people, wounding many thousands more, and reducing to ruins a flourishing city of 70,000 inhabitants. Such a disaster called for immediate and widespread Red Cross action. The Society contributed over Rs. 30,000 to the Relief Funds and forwarded another Rs. 53,382 sent by foreign Red Cross Societies. It mobilised 27 nurses from headquarters and 20 nurses through the Bombay Branch, and in addition to personnel and funds, sent large consignments of splints, bandages, dressings, etc., as well as tents. Collecting depôts for clothing were opened in Simla and Lahore, and consignments for the refugees were despatched daily.

Another important event was the outbreak of the Italo-Ethiopian War in the first week of October, which led to a vast mobilization of Red Cross resources, both in personnel and supplies. The International Red Cross Committee in October offered aid to both belligerents, an offer which was accepted only by the Ethiopian Red Cross. Legal advice obtained from different quarters agreed that the provisions of Act XV of 1920 prevented the Society from spending its funds outside India, except in the case of an Indian expeditionary force. The Society, however, publicly announced its willingness to receive gifts from the public either in cash or kind, for transmission to the Ethiopian Red Cross. Up to the end of 1935 four consignments of bandages, dressings, chlorine, vaccine, etc., had been forwarded and about Rs. 500 in cash.

Membership.—The total number of members enrolled in all categories was 18,713 compared with 15,912 at the end of 1934, so it is possible again to report an increase. The Punjab Branch this year reports 9,469 members, a splendid total, and next year it will probably reach five figures. Very few other Branches can report even four figures, but Assam, Sind and the United Provinces have all over 1,000 members. The branches which have done

*Prepared from a note supplied by Miss Norah Hill, A.R.R.C., Organising Secretary, Indian Red Cross Society.

best in membership this year are Assam, Kotah, Madras, the Punjab and the United Provinces. Madras has shown an impressive increase from 364 in 1934 to 981 in 1935, largely due to the strenuous efforts of its district branches.

Maternity and Child Welfare Bureau.—Dr. Jean Orkney, W.M.S., who had been in charge of the Maternity and Child Welfare Section of the All-India Institute of Hygiene and Public Health, Calcutta, succeeded Dr. Ruth Young, M.B.E., W.M.S., as Director of the Bureau at the end of December.

Four Health Schools in Delhi, Poona, Madras and Rangoon, were aided with grants, and other institutions which received help were the Mothercraft Training School, Bareilly, the Vocational Institute Nursery School, Mysore, and the Calcutta Health Week Welfare Centre attached to the All-India Institute of Hygiene.

The total grants from the Victoria Memorial Scholarship Fund for training of indigenous *dais* amounted to Rs. 14,492 to Indian States and Rs. 22,147 to provinces in British India. Good progress is being made in most of the provinces, but in the States it is much less marked.

Army child welfare continues to receive a great deal of the Director's time and attention. Reports were submitted by 43 British Army stations and 59 Indian Army stations. In the latter some degree of medical relief for women and children is now provided in almost all stations, but there is room for great advance in the welfare services. Many reports mention difficulty in getting suitable doctors and nurses. In Quetta the hospital building was damaged beyond repair during the earthquake, and it has been closed for an indefinite period.

King George Thanksgiving (Anti-Tuberculosis) Fund.—The Fund received Rs. 86,000 out of the Silver Jubilee allotment to Red Cross Headquarters.

The travelling cinema lorry fitted up by headquarters started touring in March. It toured in the Punjab from March to May, in the United Provinces in August and September, and in Ajmer-Merwara, Rajputana and Central India in December. The visits of the lorry aroused great interest amongst the public.

A special training course in tuberculosis was organised by the Fund at the All-India Institute of Hygiene and Public Health, Calcutta, from February 4 to 23, 1935, and was attended by 25 doctors.

The Hasan Suhrawardy Anti-Tuberculosis Challenge Shield was awarded to the Tuberculosis Association of Bengal, for having done the best anti-tuberculosis work in India during 1934.

A large amount of propaganda material was distributed both by headquarters and through the 16 provincial and state anti-tuberculosis committees, all of which are carrying on active propaganda.

Junior Red Cross.—Junior membership again showed an increase, from 351,656 to 370,669, and the reports sent in by branches make very encouraging reading. Training conferences for teachers on Red Cross activities were organised at Sukkur (Sind), Shillong (Assam) and Coonoor (Madras), and were well attended.

There has been increased Junior Red Cross activity in girls' schools, especially in the Punjab, where a medical inspection programme is being carried out under Dr. Curjel Wilson's supervision, and a School Hygiene Certificate course for women teachers has been inaugurated.

The propaganda for prevention of blindness has been continued and a large number of vernacular pamphlets have been distributed, while lectures

for teachers have been given in training institutions with the help of the generous grant received from the National Institute for the Blind.

Juniors also collected large sums and did very useful work both for the Silver Jubilee Fund and the Quetta Earthquake.

Cinema Section.—The Section was very busy throughout the year, as films as a method of teaching health are becoming increasingly popular. The Section produced a new film of 2,500 ft., entitled " What the Red Cross does in India ", which was released in December. Work on another film entitled " Two Ways of Living ", dealing with housing, is well advanced, and a beginning has been made with a third film dealing with village welfare, most of which was " shot " near Rawalpindi. A new copy of the film " Prevention of Blindness " was prepared as the old one got worn through constant use.

The Film Circulating Library has proved very popular and 253 films were distributed, 163 of 35 mm. size and 90 of 16 mm. against 105 and 55 respectively last year. Four new 16 mm. films were purchased during the year.

A short 35 mm. talkie film, entitled, " The Eyes have it ", was presented to the Society by the National Ophthalmic Treatment Board, London.

The Section for the first time prepared magic lantern slides ; 12 sets on school hygiene, 36 sets on " prevention of blindness " ; and one set on tuberculosis were manufactured, a total of 1,728 slides.

Propaganda and Publicity.—The Red Cross Journal continues to pay its own way with the support of advertisers ; 4 pictorial supplements were issued. Two popular series of articles this year were those on nutrition, and a series on " The chief preventible blinding diseases of childhood " by Lieut.-Colonel R. E. Wright, C.I.E., I.M.S.

A number of new publications and posters were issued by headquarters during the year.

Nurses and Volunteers.—The scheme for the enrolment of trained nurses for emergency service has been approved but has yet to be put into action. During the year various financial and other details were completed, and the co-operation of the branches has now been invited.

The voluntary aid detachment scheme for supplying volunteer nurses to military hospitals is being operated by the St. John Ambulance Brigade Nursing Divisions.

The " volunteer service scheme ", which aims at enrolling and training Red Cross members for various types of volunteer service, has been published in pamphlet form and is now being operated by a number of branches.

Rural Welfare.—In view of the increased interest in rural welfare, stimulated by the grants made by the Government of India to Provincial Governments, the Society has paid special attention to village activities, and has made a beginning in providing special propaganda material for use in village work. The material issued by headquarters will eventually include a film, a set of posters, lantern slides and a pamphlet on rural work for Red Cross branches. The film has been begun and enquiries are being carried out about existing posters and slides. A pamphlet has also been drafted ; during 1936 it is hoped to issue most of this propaganda material.

The United Provinces branch has also paid special attention to rural propaganda, and has issued useful slides and pamphlets. Its junior groups do valuable work in village schools.

The Bombay branch has travelling dispensaries in rural areas and employs travelling lecturers in others. The Central Provinces and Berar Branch, which has made great strides in establishing rural welfare centres, has received a special Government grant of Rs. 5,000.

The St. John Ambulance Association (Indian Council) and St. John Ambulance Brigade Overseas.*

149. In recent years the financial difficulties of the Association have been frequently mentioned, but thanks to the good offices of Their Excellencies Lord and Lady Willingdon and the graciousness of His late Majesty King George V, these difficulties have now been solved to a considerable extent by the inclusion of the St. John Ambulance Association as one of the beneficiaries to Their Majesties' Silver Jubilee Fund in India, from which the Association has received a sum of Rs. 2,73,000. It is hoped that this will enable the Indian Council to stabilize its financial position and to look forward to an expansion of its activities in many needed directions.

In the last report mention was made at the outset of the Bihar Earthquake which was described as one of the worst calamities of this nature that India has ever experienced. But the Quetta Earthquake which occurred on 31st May 1935, was even more terrible for although it affected a small area, the loss of life was much greater. The St. John Ambulance Association, the St. John Ambulance Brigade Overseas and the Indian Red Cross Society, both at headquarters and in the provinces, at once mobilised for action and a relief party which was later further reinforced, proceeded to the scene of the disaster within 24 hours of its occurrence.

During the year 28,105 persons attended courses of instruction in first-aid, home nursing, hygiene and sanitation, domestic hygiene and mothercraft, of whom 18,295 qualified for the Association's certificates, namely 16,491 in first aid, 1,038 in home nursing, 585 in hygiene and sanitation, and 181 in domestic hygiene and mothercraft. In addition 607 persons obtained the voucher certificate by passing a second higher test in first aid, 178 obtained medallions by passing the same examination for the third time, and 101 labels and 22 pendants were earned by passing further re-examinations in first aid and home nursing respectively. The Mackenzie School Course continued to grow in popularity and during the year under report 10,643 students received instruction, of whom 7,665 qualified for certificates.

During 1935, an Indian supplement to " First aid to the injured " was prepared and 10,000 copies have been printed. It contains useful suggestions for using Indian articles (*puggries, lathis, charpoys*, etc.) in improvising first aid, and gives valuable information about the effects of heat, treatment of rabies, and snakes and snake-bite treatment. It fills a long-felt want and will be an invaluable aid to lecturers as well as students. It is proposed to publish the book in the vernaculars and to bind these with the vernacular editions of the first aid manual. A revised edition of the manual for the Mackenzie School Course was also published. This edition contains many improvements and is now suitable for girls also. A new manual for the combined hygiene and sanitation course has also been written and is gradually being introduced.

During the year under report a total of 25,177 books have been sold from the St. John Ambulance Stores Depot, an increase of 4,301 over the 1934 figures.

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* Prepared from a note supplied by Miss Norah Hill, Secretary, Indian Red Cross Society.

The two first aid road stations in Calcutta continued to do very useful work. The total number of cases dealt with was 896, of which 728 were treated on the spot and 126 sent to hospital. In 20 cases the ambulance had to be summoned.

The first voluntary aid detachment consisting of 16 fully-qualified members was formed in Calcutta about the end of the year and training and enrolment were in progress in Lahore and Burma when the year closed. Field Marshal Sir Philip Chetwode, Bart., G.C.B., G.C.S.I., K.C.M.G., D.S.O., prior to his departure from India, wrote to the Army Commanders commending the scheme to their support, and asking for their assistance in obtaining recruits for the detachments by encouraging wives and daughters of officers, and other ranks of the army, to qualify and enrol as members of nursing divisions.

St. John Ambulance Brigade Overseas (Empire of India).—The report for 1934 began with an account of the great earthquake in Bihar. Unhappily the report for the year 1935 must also open with the account of a similar disaster in Quetta, which evoked a splendid response by those members of the St. John Ambulance Brigade Overseas who were called upon to take part in the relief work.

Immediately on receipt of the news, Dr. J. Cairns, C.I.E., O.B.E., Assistant Commissioner, No. 1 District, ordered mobilization of St. John Divisions, both Ambulance and Nursing, and on the evening of the 31st May he left for Quetta with a relief party of 8 officers and sisters of the nursing divisions and 30 officers and men of the Indian Railway Ambulance Division. First aid dressing posts were set up on the station platform and the approach roads, and by the 2nd June, 1,500 cases of injury had been dealt with at these posts. Great assistance was also rendered by the officers and members of the St. John Ambulance Brigade to injured and feeble refugees and in the removal of injured persons to hospitals. All refugee trains which left Quetta between 2nd and 7th June were provided with ambulance personnel, and some of the Brigade men did several journeys between Quetta and Sukkur and Quetta and Lahore. In the evacuation of stretcher cases by ambulance trains, although these trains were staffed with military personnel, Brigade Nursing and Ambulance members rendered great service in assisting in the transfer of the cases from the motor transport vehicles into the trains and in seeing to their comfort. A very useful piece of work was done by the nursing sisters in attending to injured *purdah* women who had been extricated from the ruins.

The Assistant Commissioner estimated that up to 10th June, over 12,000 dressings had been done at the first aid posts in the railway area, while over 700 " sitting " and " walking " cases and a similar number of " stretcher " cases were evacuated by trains.

As regards relief work carried out by officers and members of No. 1 district at other places, a party of 9 officers and sisters of the various local nursing divisions did duty in the Mayo Hospital, Lahore. All the ambulance officers and men did ambulance duty at Lahore station on their return from Quetta up till the 8th July.

The progress reported in last year's report was maintained in 1935, and the year saw the establishment of two new districts, *viz.*, the Burma district and the E. I. Railway district. No. II district has had to be further subdivided by the creation of the Calcutta Police Sub-District. Four new Ambulance divisions, one each in Bengal and Delhi and two in Burma, were formed during the year. Special importance attaches to the formation of a new nursing division in Bombay, called the Bombay (Muslim) Nursing Division, in

April 1935. This unit has been established under the aegis of the Muslim Ambulance Society, which is to be warmly congratulated on having formed this pioneer division. Four cadet divisions were formed at Lucknow, Moradabad and Fyzabad in the United Provinces; these continued to be under the direct charge of the Chief Commissioner for the Empire of India. At the end of 1935 therefore, the strength of the Brigade Overseas in India comprised seven districts, 69 ambulance, 13 nursing, 13 cadet ambulance and 6 cadet nursing divisions, with a total strength of 2,772 members.

The services rendered by Brigade Ambulance and nursing divisions were very varied and included rendering first aid on railways and in railway workshops, attendance at *melas*, sports, parades, etc., the removal of sick and injured persons in ambulances, assistance at hospital out-patient departments and school medical inspections.

British Empire Leprosy Relief Association (Indian Council)*.

150. The British Empire Leprosy Relief Association (Indian Council) has continued its programme of anti-leprosy work in 1935 by means of scientific research into the epidemiology and treatment of the disease, educational propaganda, treatment clinics and the training of doctors.

Research work has been carried on in Calcutta, in collaboration with the School of Tropical Medicine and the Indian Research Fund Association, at a cost to the Association of a sum of Rs. 31,000. This work has embraced clinical, pathological and bacteriological investigations, besides treatment which provides material for research and instruction.

In addition to routine measures, experimental treatment has been carried on in selected cases in order to test the value of " leprolin ". Leprolin is an emulsion of lepra bacilli prepared by a special method from the nodules of leprous patients, and contains a roughly standardised number of lepra bacilli. The early results of treatment with this preparation have been favourable. Electrical treatment by diathermy has also been found to be of considerable value particularly in the treatment of inflammatory conditions arising in the nerves.

Attempts to culture *M. Leprae* and *M. Leprae muris* have been continued without success. In order to verify the reports for successful cultures made by other workers, research work has been done, on a subject which has hitherto received little attention, namely, the application of tissue culture methods by the use of growing tissue as a culture medium for the leprosy organisms. Rat tissues and *M. Leprae muris* were used for the most part. Whilst a few encouraging results have been obtained, no definite proof of multiplication of the bacilli has yet been found.

The propaganda officer of the Association toured in Madras, Cochin State, Bihar and Orissa, the United and the Central Provinces, visiting leprosy clinics, giving lectures and demonstrations to medical students and doctors and advising local bodies and provincial branches in their anti-leprosy campaigns. Useful investigations were also made by him on the incidence of leprosy among the children. The inspection of 58,000 children in 300 schools in a Madras district resulted in the detection of 514 clinically positive cases of leprosy, while 476 cases were detected in the Madras City Corporation schools.

A special course in diagnosis and treatment was held at the School of Tropical Medicine, Calcutta. This was attended by 17 doctors from all over India

* Prepared from a note supplied by the Honorary Secretary, British Empire Leprosy Relief Association (Indian Council).

and one from the Seychelles Islands, bringing the number of doctors trained by the Association at Calcutta to 765. Two similar instructional courses were held, under the auspices of the Association, at the Leper Hospital at Dichpalli in Hyderabad State for the final year students of the Osmania Medical College and for the doctors of the State Medical Department. Lectures were also given to the D.T.M., L.T.M. and D.P.H. classes at the Calcutta School of Tropical Medicine.

The reports for 1935 received from the provincial and state branches show that the scientific knowledge gained through research carried on at Calcutta and elsewhere is gradually filtering through the barriers of superstition and apathy. The leper has thus become more willing and ready to seek treatment instead of concealing his malady.

The number of treatment clinics has increased in many provinces. In Bombay, out of 2,514 patients who received treatment regularly, 7·7% were discharged as totally cured and 37·5% showed marked improvement. In the Madras Presidency, over 30,000 new cases were treated at 441 clinics during the first nine months of the year and over 200,000 attendances were recorded each quarter. In the Punjab, the benefit received by leper patients aroused considerable interest. A total of 1,215 cases received regular treatment at 57 clinics in the province; of these 159 were reported as relatively cured, 241 much improved and 380 improved. Similar encouraging results are reported from other provinces.

The work done by the Association during the last 10 years indicates that the leper is now beginning to feel that he is not an outcast, that his life is not doomed, but that his disease is curable and his return to a life of usefulness is not an impossibility.

The Countess of Dufferin's Fund and Women's Medical Service.

151. The celebration of its Silver Jubilee made 1935 a memorable year in the history of the National Association for Supplying Medical Aid by Women to the Women of India (Countess of Dufferin's Fund).

The main source of income of this Fund is the interest on its investments which amounted to Rs. 7·20 lakhs on the 1st January, 1935. The Government of India grant for 1935-36 was restored to its full figure of Rs. 3,70,000.

The usual grants were given to provincial Dufferin branches and to various hospitals and other institutions, 18 scholarships were given to students in the Lady Hardinge Medical College, Delhi; and 3 each in Bombay, Madras and Calcutta. Of these 18 were awarded from the Association's funds and the others from trust funds administered by the Dufferin Council.

The Association continued to assist maternity and child welfare work, not only by paying the salary of the W.M.S. officer in charge of the Maternity and Child Welfare section in the All-India Institute of Hygiene and Public Health, Calcutta, but by financing the model centre used for teaching purposes.

The cadre of the Women's Medical Service consists of 42 officers excluding 7 temporary members and a training reserve of 12 officers.

Lady Minto's Indian Nursing Association.

152. The income of this Association is made up of an annual Government subsidy of Rs. 32,500; of interest on invested funds amounting to Rs. 25,819, donations, fees, subscriptions totalling Rs. 1,53,225; and miscellaneous headings Rs. 2,977.

The nursing staff is composed of European nursing sisters possessing maternity qualifications. They are for the most part recruited under a 5 or 3 years agreement, by a selection committee in England.

The following nursing homes and hospitals are staffed by nursing sisters of this Association :—

(1) The Walker Hospital, Simla ; (2) the Ripon Hospital, Simla ; (3) Hindu Rao Hospital, Delhi ; (4) the Georgina McRobert Hospital, Cawnpore ; (5) Portmore nursing home, Simla ; (6) the Kashmir nursing home, Srinagar ; (7) the railway hospital, Ajmer ; (8) the Lady Willingdon nursing home, New Delhi and (9) the Murree nursing home, Murree.

During the year, the nursing sisters attended 3,106 cases, including 1,624 medical, 1,064 surgical, 178 infectious, 5 mental, 32 massage and 203 maternity cases.

The Bombay Presidency Baby and Health Week Association.

153. This Association, assisted by a Government grant of Rs. 4,990, continued its numerous health propaganda activities. A special Govt. grant of Rs. 3,000 was given for rural health work.

A revised set of 40 magic lantern slides on 'Food and Health' with a key lecture was prepared. 659 reels of cinema films on public health and child welfare topics were projected.

25,500 copies of a valuable pamphlet on 'Balanced Diets' were published in English, Marathi, Gujarati and Hindi ; these had a wide circulation and were greatly appreciated. The Trustees of the Sir Dorabji Tata Trust gave the Association a grant of Rs. 300 a month for a period of three years for carrying out research work on cheap balanced diets and the Governing Body of the Indian Research Fund Association sanctioned Rs. 6,000 a year for three years to assist this research. The present programme of the Association on nutrition work includes the feeding of groups of children on ideal diets of varying costs. The children are classified into three non-vegetarian groups, two vegetarian groups, and the effects on growth and health are noted by making careful measurements at regular intervals.

Another part of the Association's activity includes analytical and biological work in the Haffkine Institute and in the Bio-Chemistry Laboratory of the Seth G. S. Medical College. Various foods and diets are analysed, whilst some are tested on rats and their vitamin values ascertained.

Efforts are also being made to determine Indian standards of growth and nutrition by measuring the growth records of nearly 20,000 healthy children of different Indian communities attending primary and middle schools in Bombay and in district towns.

*Activities of the International Health Division of the Rockefeller Foundation in India during 1935.

154. In 1935 three members of the International Health Division of the Rockefeller Foundation were stationed in India, with offices at Madras, Bangalore and Delhi. One of the officers acted as adviser in Public Health to the Travancore and Mysore Governments.

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*Supplied by Dr. W. P. Jacocks, Representative in India of the Rockefeller Foundation, International Health Division.

Financial and advisory assistance was given to Government public health activities in Travancore, Mysore, Madras and the United Provinces ; in Travancore to the Neyyattinkara Health Unit (4th year) ; in the United Provinces to the Partabgarh Health Unit (4th year), and in Madras to the Poonamalle Health Unit (1st year, beginning October 1935).

Government research and control activities in malaria and dracontiasis were given assistance in Mysore State and arrangements were made during the year to set up a special malaria research office in Madras.

During 1935 five fellowships were granted to Indians for study in foreign countries and in India and one travel grant was awarded to a medical officer of health to study health unit work in Ceylon. Four other fellows completed their studies during the year.

SECTION XII.
MISCELLANEOUS.
Nutrition.

155. The question of nutrition has within recent years commanded such widespread interest not only from medical and agricultural research workers but also from politicians and the general public that this report would be seriously incomplete if it made no mention of the subject.

The following paragraphs published in the May, 1937, report of the Health Committee of the League of Nations, review the position.

"Since 1935, the Health Organisation has been engaged in the study of nutrition in its relation to public health; the preceding Health Committee in 1934 included in its three-year programme the drafting of a general report on the problem of nutrition and entrusted this task to Dr. W. R. Aykroyd and Dr. Etienne Burnet. This report, intended primarily for public health administrations, defines the rôle of nutrition in public health and preventive medicine; it served as a basis for discussion when, at the sixteenth Assembly, twelve delegations requested the inscription of this problem on the agenda.

"On the proposal of the Australian delegate, the Assembly recommended that the Health Organisation should continue and develop its work on nutrition in collaboration with the technical organisations of the League, the International Labour Office and the International Institute of Agriculture; at the same time, the Assembly decided upon the creation of a Mixed Committee of experts in agriculture, economics and public health, with the mandate of presenting a general report to the next Assembly on the problem of nutrition in its public health and economic aspects. The nineteenth International Labour Conference (1935) adopted a similar recommendation.

"In October, 1935, the Health Committee having considered the Burnet-Aykroyd report, decided to set up a Technical Commission on Nutrition. This Commission, at its first session in London in November 1935, laid down the physiological bases of nutrition and established the food requirements of human beings during their growth, from conception until adult age. With a view to the application of the recommendations of the Committee in different countries and their adaptation to varying geographic, economic and social conditions, the report was communicated to learned societies and social study institutions in various countries.

"At its second session held in Geneva in June 1936, the Technical Commission examined the observations communicated by various bodies, and revised and amplified its London report in certain respects. This revised report was communicated to the mixed Committee, in conformity with the Assembly's resolution in 1935, and was included in that Committee's report to the 1936 Assembly.

"The report of the Technical Commission recommended for further study a list of problems as follows:—

(*a*) Assessment of the nutritional state of children;
(*b*) Nutritive food requirements during the first year of life;
(*c*) Minimum vitamin and mineral requirements;
(*d*) Minimum fat requirements;
(*e*) The nutritive and "supplementary" values of the different protein-containing foods, to determine to what extent and in what forms animal protein is necessary for growth and health;
(*f*) The relative nutritive value of different cereals according to the degree of milling;
(*g*) The extent to which the increasing consumption of sugar is detrimental to health;
(*h*) Influence of climate on food requirements;
(*i*) The extent to which diets in common use fall below the standards recommended in this report;
(*j*) The optimum amounts of milk required at different ages.

"The study of questions (*a*) and (*b*) was considered by two consultations of physiologists and pediatricians (December 1936), representing the national agencies to whom

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Abbreviations:—
U. P. . . . United Provinces of Agra and Oudh.
C. P. . . . Central Provinces and Berar.
N. W. F. P. . . North West Frontier Province.
P. H. C. . . . Public Health Commissioner with the Government of India.
M. O. Hs. . . . Medical Officers of Health.

the Technical Commission's report had been submitted. As regards the methods of assessment of the nutritional state of children, the experts recommended different types of survey in accordance with the number of children to be examined. The first type is applicable to the state of nutrition of large groups of children ; it is limited to a record of age, sex, physical appearance, weight and height. The second type of survey involves more extensive tests but applied to smaller groups of children. In addition to the tests under type I, a thorough medical examination is recommended as well as an economic and social survey of the families. The third type of enquiry, biotypological in character aims at studying the disturbances affecting the human body owing to a quantitatively and qualitatively deficient diet. The latter type will include various somatometric and physiological measurements, bearing upon the different bodily functions, as well as blood and sensorial measurements and psychological tests. Several of these different types of study are being carried out in Belgium, France, the Netherlands, the United States, the United Kingdom, Poland and Norway ; others, of the first and second types, are contemplated in Sweden, Czechoslovakia and Austria and will deal with 50,000, 10,000 and 20,000 children respectively.

" The second group of experts has determined the nutritive food requirements during the first year of life. The participants distributed among themselves the following three problems for further study :

(*1*) Has the daily administration of more than 750 cc of cow's milk to children between 6 and 12 months any unfavourable influence on the nutritive exchanges and particularly on the absorption of calcium and iron ?

(*2*) What are the differences between the action of an artificial preparation of an irradiated sterol and that of irradiated milk, when quantities containing the same number of international units of vitamin D are administered ?

(*3*) Is it desirable to provide systematic preventive treatment against anaemia for all children between 4 and 12 months by the administration of an iron salt ?

" The problems recommended for study under (*c*), (*d*) and (*e*) above should now be taken up in some detail—namely, the minimum vitamin, mineral and fat requirements at different ages, and the nutritive and " supplementary " values of the different protein-containing foods. These problems have been submitted to the learned societies and scientific bodies in several countries, which in some instances have nominated special commissions ou rapporteurs for the purpose. It is on these questions that study will be concentrated during 1937—namely, in three successive stages. First, the drafting of a report which will be based, in particular, on the views expressed by the leading scientific institutions and national nutrition commissions ; next, the consideration of that report by a group of experts and formulation by them of relevant recommendations ; finally, the deliberation of the Technical Commission on those recommendations and its advice thereon.

" As regards the question of the optimum amount of milk required at different ages (problem *j*), this should be studied in its relation to human growth, the pathogenics of rickets, dental caries and anaemia and correlated to climatic factors and dietary habits of populations. These studies should be based on the experimental studies in animal metabolism and on observations made in children's institutions (nutritional state and growth of children receiving supplementary milk ration as against children not in receipt of this ration). Similar observations should be made in the case of nursing and pregnant mothers.

" A general study should be made of the problems under (*h*) and (*i*), in order to establish, on the one hand, the extent to which dietaries in common use fall below the standards recommended in the report of the Technical Commission, and, on the other, what are the differences observed as regards the state of nutrition of people in different countries or in different regions of the same country. Should such differences be found, it would be necessary to determine whether they are essentially due to the influence of climate.

" Finally, the attention of the Health Committee has been drawn to the interest there would also be in a study of the adulteration of foodstuffs, particularly of the addition of antiseptics and colouring matters.

" The work of the Technical Commission on Nutrition has aroused the greatest interest both in the medical world and outside it. The Commission's first report on the physiological bases of nutrition has created a considerable impression, not only in Europe, but also overseas. Thus, the agenda of the Inter-Governmental Conference of Far Eastern Countries on Rural Hygiene includes items inspired by the Commission's report such as the composition of dietaries, nutritive value of the principal foods, deficiency diseases, the method of their investigation having to be adapted to local contingencies. Likewise the Commission's recommendations will be followed in the action following on the study made by Professor Dragoni and Professor Burnet in 1935 in regard to popular nutrition in Chile.

" Finally, problems concerning nutrition cannot fail to figure prominently in the agenda of the Conference on Rural Hygiene in American countries and in that of the European Conference on rural life. "

" The procedure followed up to the present in the study of nutrition by the Health Organisation has produced valuable results in a comparatively short space of time. Since, therefore, it has proved its worth, there is no reason to modify it. Thus the Technical Commission will remain the pivot of all activity in this field. For specific studies it will, as in the past, have the benefit of the collaboration of groups of specialists or can apply for authoritative opinions to national authorities, leading scientific institutions, learned societies, institutes and schools of hygiene—the latter carrying out certain field studies on behalf of the Commission. The scope of the activities contemplated is thus apparent. It is incumbent upon the Health Committee to secure their co-ordination in their different aspects."

In India, especially since the assumption of the Viceroyalty by H. E. Lord Linlithgow, interest in the question of nutrition has grown rapidly, but it is to be noted that this country was by no means behind others in the field of nutrition research. In fact, the Indian Research Fund Association with considerable foresight has for some 15 years past been financing research work on nutritional problems and the first Director of Nutrition Research, Sir Robert McCarrison, carried out pioneer investigations on different aspects of the nutrition problem and demonstrated their importance to India long before the present world-wide interest was roused. The importance of many of the facts described and published years ago by Sir Robert McCarrison is only now being generally recognised. It was not, therefore, because of lack of information that economists, doctors and agriculturists failed to appreciate the importance of nutrition in determining the state of the public health, but now that the question is in the forefront it may be hoped that the new knowledge available will, sooner rather than later, be used to benefit the people of this country, so many of whom suffer from malnutrition and deficiency diseases. " There is abundant evidence indeed that a very large proportion of the population is under nourished and that this nourishment not only affects the mental and physical energy of the individual but increases the morbidity and mortality of the multifarious infections to which he is subjected. Further, the more the matter is investigated the more sufferers from diseases due to specific food deficiencies do we recognise. On the other side we have the very low economic status of the population as a whole, a common factor in the nutrition problem in almost any country but of exceptional importance here."

In a recent note on ' Nutrition work in India ' prepared by Dr. Aykroyd, the following views are expressed :

" Hitherto the view that malnutrition is prevalent in India has rested on *a priori* reasoning ; on general knowledge of the conditions prevailing in the villages and the poorer quarters of towns and cities ; on scattered observations regarding the existence of food deficiency diseases ; on animal experiments ; on the pronouncements of experts ; rather than on exact data collected by systematic research. Research in India is, however, now being organised for the collection of these fundamental data, which will enable the whole problem to be defined and clarified, and vague general statements replaced by precise knowledge.

" Human nutrition research and public health nutrition work are impossible without knowledge of food values. There is at present no comprehensive table of food values available for general use in India. In 1935 a systematic survey of the nutritive value of Indian foodstuffs was begun in Coonoor, and has rapidly progressed. Tables giving the value of about 200 common Indian foodstuffs as regards their content of calories, proximate principles, calcium, phosphorous, and iron will shortly be published. Simultaneously about 160 foods have been investigated for their vitamin A and carotene content, a similar number for vitamin C content, and about 50 for vitamin B^2 content. Research on the biological value of the proteins of common foods is at present in progress in Coonoor and elsewhere. An investigation of the distribution in foodstuffs of the various factors in the vitamin B^2 complex is being carried out in Calcutta and also in Coonoor. In Coonoor the effect of various factors—storage, cooking, etc.—on food value has been studied.

" There is still much work to be done in this field. For example, the effect of common Indian methods of cooking on nutritive value needs further investigation. The systematic survey of nutritive values will require extension over many years. But already sufficient data has been gathered to provide the necessary basis for field research and public health work, and it is to be anticipated that nutrition work in India will be greatly stimulated by the publication of preliminary tables of food values.

" Dietary surveys are being carried out by the Coonoor and Calcutta research units. The preliminary results of surveys in progress in South Indian villages suggest the diet of the average villager is even more deficient, from the stand point of both quality and quantity, than earlier more casual investigations had indicated. It appears that the diet of the poor *ryot* in South India is composed of an insufficient quantity of cereal grains, rice or millet, and contains milk, meat, fruit and vegetables in negligible quantities or not at all. There is evidence, however, that grosser degrees of malnutrition are encountered among the poor in towns and cities, which is probably due to the fact that the latter live on a staple of milled rice, with negligible additions, while the villager usually consumes hand-pounded rice or millet which is not subjected to milling.

" Attempts are being made to study the effect on health and physique of various types of diet. The diets supplied in a number of childrens' residential hostels have been tabulated, and simultaneously investigations of the ' state of nutrition ' of children consuming these diets have been carried out. In this way it is possible to observe the relation between diet and general health, physical development, and the incidence of food deficiency disease, and also to obtain information about energy requirements. It appears that children in residential hostels in South India, though usually fed on a diet costing about Rs. 3 per month which leaves much to be desired as regards quality, are very appreciably heavier for a given height than children of the general population. This fact in itself throws light on the ' state of nutrition ' of the general population.

" Enquiries have also been carried out in day schools in South India. The Coonoor laboratories have completed an enquiry into the ' state of nutrition ' of some 5,000 school children in South Indian towns, the general result of which is to show that a high percentage of children are in a state of malnutrition and display symptoms of food deficiency disease. In this connection attention may be drawn to the annual reports of the Health Department, Corporation of Madras, which show the prevalence of malnutrition and food deficiency disease among children of the poorer class attending Corporation Schools in Madras.

" While pellagra is uncommon in India a large percentage of children in South India show a pellagra-like stomatitis which is curable by foods rich in the P-P (pellagra-preventive) factor. Xerophthalmia of varying degrees of severity is commonly met with, and Keratomalacia is one of the most important blinding diseases in South India. Follicular keratosis of the skin, due to diet deficiency, is of extremely common occurrence.

" Striking evidence that average Indian children are in a subnormal ' state of nutrition ' has been provided by experiments with skimmed milk. These preliminary experiments carried out in children's homes indicate that skim milk, fed in comparatively small quantities, is a valuable addition to average South Indian diets. The fact that stomatitis, a common deficiency disease, disappears when skim milk is fed, is of obvious importance. The greatest improvement in general health and vitality occurred in the girls receiving 1·5 ozs. of skim milk powder daily, and it is probable that the best results would be obtained by giving quantities of this order or more. It is to be observed, however, that the addition of even small quantities of milk in this form,—the cheapest form,—involves a considerable percentage increase in expenditure on food. "

" Further evidence of widespread malnutrition is provided by blood examination. It has been found that the haemoglobin content of the blood of South Indians is on the average some 20 % below European standards. This low haemoglobin content does not appear to be physiological; it is probably evidence of mild anaemia resulting from the consumption of a diet poor in iron. If large doses of iron are given to South Indian children, their haemoglobin rapidly rises. It is therefore probable that typical Indian diets contain insufficient " available " iron to maintain the blood in a fully satisfactory condition.

" Preliminary clinical experiments suggest that a large proportion of the population may be in a state of ' vitamin C subnutrition ', which is in conformity with the observation that intake of fruit and vegetables is in general small. Overt scurvy does not, however, appear to be common. The relation between a low intake or vitamin C and ' state of nutrition ' needs further investigation.

" Basal metabolism studies have been undertaken; in general these indicate that the basal metabolism of average Indians is lower than that of average North Americans or Europeans. "

Largely because of the emphasis which His Excellency has at different times laid on the practical human importance of the subject and also as the result of a survey the food supplies of Madras Presidency in relation to " consumption units ' which Dr. Aykroyd, the Director of Nutrition Research, had carried out, the Governing Body of the Indian Research Fund Association reached the conclusion that the time had come for the formation of an advisory committee, the members of which should have special knowledge of the problems associated with human and animal nutrition. The main functions of this Committee, it was thought, should be to advise on programmes of research work in the field of nutrition ; to make recommendations in regard to nutrition surveys ; and to indicate methods to be adopted for dissemination among the urban and rural populations of this country of the facts elicited from these researches and surveys.

In May 1936, a Nutrition Advisory Committee was appointed with the P. H. C. as Chairman and Dr. Aykroyd as its Secretary. This Committee held its inaugural meeting in Simla on 18th, 19th and 20th June 1936, and was honoured by the presence of H. E. the Viceroy who opened the proceedings.

His Excellency emphasised the need of practical application in the homes of the people of the fruits of research work in terms of the diet of both rural and urban populations. He also referred to the proposals envisaged by the Royal Commission on Agriculture and endorsed by the Royal Commission on Labour to set up a Central Institute of Nutrition. He particularly remarked on the need for establishing a link between research on the problems of human nutrition and those of agriculture and invited the members of the Advisory Committee to consider the expediency of establishing a point of contact between these two branches of science.

It will, therefore, be of interest to indicate briefly the steps which have recently been taken to make a beginning at least in giving effect to this policy. While India had in Sir Robert McCarrison, and has now in his successor Dr. Aykroyd, a specialist of international eminence, the ordinary machinery of Public Health administration does not include Public Health Officers with a special knowledge of its technique or special training for propaganda or other activities aiming at the practical application of the results of laboratory investigations. This was perhaps natural in the early years of nutrition work, as the first objective obviously was to collect the scientific data on which practical work extending to the homes of the people could be based. This material having been brought together by the labours of Sir Robert McCarrison and his associates both in the laboratory and the field, the time is now ripe for a move to popularise these results.

A report of the Advisory Committee's proceedings was issued as soon as possible and copies were circulated to all local Governments by the Government of India. In the first place, the Committee drew attention to the need for a preliminary survey of the " state of nutrition in relation to the dietary habits of the people ", if the state of nutrition in India were to be improved. These preliminary surveys, it was recommended, should be carried out in representative areas throughout the whole country on the lines indicated in the Committee's report.

Emphasis was also laid on the importance of every local Government having at least one officer with special knowledge of the subject. It was proposed by the Committee that a three months' course of training at the Nutrition Research Laboratories in Coonoor should be arranged for officers

deputed by the Central and Local Governments so that every Government might have at least one officer in its Public Health Department with that special knowledge.

The first response of local Governments to this proposal was somewhat disappointing, perhaps because there seemed to have been some misapprehension in regard to the expenditure involved. After a further letter on the subject was sent out by the Government of India, it was decided to proceed with the proposal and the course of training envisaged by the Nutrition Advisory Committee commenced at Coonoor on 15th April, 1937. Those attending the course include Medical Officers of Health from : (*a*) Madras ; (*b*) United Provinces ; (*c*) Burma ; (*d*) Bihar ; (*e*) Bengal ; (*f*) Orissa ; and (*g*) Punjab ; and (*h*) permission has also been given to the Medical Inspector of Schools, Indore, to attend the course. These workers will be attached to public health departments, and their functions will include : the determination of height-weight-age averages in different social groups, the detection of malnutrition in schools, the planning of institutional diets, the preparation of educational material and the organisation of propaganda work in towns and villages.

It is hoped that it may be possible to hold a further course of the same kind in the near future and that those provinces not represented at the present course will realise the advantage to be gained by sending one of their officers to Coonoor for the training and instruction given there. There can be little doubt that the medical and public health departments of every local Government will in the near future be compelled to co-ordinate the question of nutrition, both human and animal, with their normal activities, if their work is to be made more effective. It seems reasonable to believe that this end can be reached to some extent by having in these departments at least one officer having up-to-date knowledge of the intricate problems associated with malnutrition and deficiency disease and of the means by which these defects can be remedied.

In accordance with another of the recommendations made by the Nutrition Advisory Committee, the Governing Body, I. R. F. A., have appointed an experienced officer whose duty it will be to develop and maintain a close liasion between human nutrition work and agricultural research. This officer is now at Coonoor undergoing a six months' intensive training under Dr. Aykroyd. At the end of this period he will be given accommodation in the Imperial Agricultural Research Institute, Delhi, where he will be in immediate touch with the research activities of the workers in the agricultural field. His main function will be to link up the results of human nutrition research with agricultural investigations and to indicate to agricultural workers the adjustments which seem to be required to meet the varying nutritional requirements of the populations of India. At the present moment, it is not possible, nor does it seem wholly desirable, to attempt to make a more exact definition of the liasion officer's duties and functions. Rather it is hoped that time and experience will indicate the lines along which his activities can best be directed.

It may be added that Sir John Russell agrees with the importance of this appointment ; in his opinion it will link up two very effective services and cannot fail to lead to important developments both on the agricultural and the dietetic sides.

Yet another of the recommendations made by the Nutrition Advisory Committee has been accepted. Three field workers on nutrition have been appointed and are now in Coonoor receiving training with special reference to the conduct of dietary surveys. On the advice of Dr. Aykroyd, who already

has on his staff officers who have been engaged in this type of work in South India, these three new workers have been recruited with the intention of carrying out additional surveys in representative areas of Bengal and Assam, of the U. P. and the Punjab. Exact knowledge of the diets in common use is an essential preliminary to other investigations and to recommendations for improvement of nutritional needs. It is hoped that all local Governments will realise the advantage to be gained from this work by the populations under their charge and that they will assist in promoting these surveys by instructing the officers of their Medical, Public Health, Agricultural and other Departments to co-operate with the workers it is proposed to employ in carrying them out.

Under the auspices of the Royal Society, London, and by means of a grant from funds originally placed at the disposal of the Royal Society by an Indian philanthropist, Dr. Curjel Wilson, lately a member of the W. M. S., has during last winter carried out a wide series of dietary surveys among families in the Punjab and in Delhi Province. The data collected by Dr. Wilson are now being examined statistically and are being prepared for publication. These data should be of great value to the Governments concerned in their efforts to improve conditions among the poorer classes of society.

It is gratifying to be able to record that, in both Provinces in which Dr. Wilson carried out her work, the local Governments gave her willing and valuable co-operation without which it would have been almost impossible to obtain results. Not only did the Punjab Government give assistance through their official Departments, but they sanctioned a grant of Rs. 500 which was utilised by Dr. Wilson to facilitate her collection of the food expenditure and consumption of individual families. Dr. Wilson intends to carry out similar work next cold weather in the Central Provinces and Orissa and there is reason to hope that the Governments of those two Provinces will co-operate in the same generous fashion. Only those who have had practical experience of the work involved in carrying out dietary surveys can realise the immense difficulties of that task and it is only made at all possible where Governments and others interested give active and continued assistance. These surveys, it may be repeated, are the very basis of all nutrition work, and it is essential for success that they should be prepared in as accurate a fashion as possible. Inaccuracies are difficult to avoid, but every inaccuracy detracts heavily from their value.

The Nutrition Advisory Committee also recommended that an Assistant Director of Nutritional Research should be appointed. The Committee were of opinion that the Director would be overburdened, if he attempted to control all the new field work in addition to the experimental and laboratory research units whose activities have during recent years continued to expand in different directions. The Governing Body, I. R. F. A., accepted the Advisory Committee's recommendation and have already taken steps to recruit an officer possessing the requisite qualifications. When that officer takes up his duties, Dr. Aykroyd will be able to devote more of his time to field work and to get into closer and more frequent touch with the Medical and Public Health Departments of the various provinces.

The subject of propaganda, or as His Excellency put it, the need for practical application in the homes of the people of the fruits of research, is also being energetically pursued. In 1928, Sir Robert McCarrison published a small book entitled ' Food ' which has gone through several editions and which has also been translated into a number of vernacular languages. This book

has been widely used by those in charge of hostels, boarding schools and similar institutions and has been of great value to those concerned in improving the diets of the children under their charge, especially when finances have forbidden any large additional costs. Human nutrition research and public health nutrition work are, however, impossible without knowledge of food values. There has been up till recently no comprehensive table of food values available for general use in India, but in 1935, under the auspices of the Indian Research Fund Association, a systematic survey of common foodstuffs in India was undertaken and this has progressed so rapidly that Dr. Aykroyd, Director, Nutrition Research, has been able recently to issue a Health Bulletin which summarises the available knowledge concerning the nutritive value of Indian foodstuffs for the benefit of public health workers, medical practitioners, superintendents of residential institutions and others interested in practical dietetics. With the help of the tables in this Bulletin it is possible to work out ' balanced diets ' for individuals and groups and, in order to indicate what is meant by a ' balanced diet ', a brief statement outlining modern dietetic principles is to be found in the first sections of the Bulletin. This Bulletin which has been issued at the nominal price of two annas contains a mine of information from which it will be possible for public health administrators and others to extract material which can usefully be issued in leaflet or pamphlet form in the local vernaculars. It is impossible in these pages to go into details, but a study of the Bulletin will amply reward the interested reader. Other notes, such as those recently issued from the Nutritional Laboratory at Coonoor on the value of skimmed milk, are issued at intervals. Arrangements are also under way for the preparation of series of coloured posters. In these different ways it is hoped to pass on acquired knowledge so that those interested may use that knowledge for the benefit of the general population of the country.

In order to give some idea of the expenditure on nutrition work which has been and will be incurred by the Indian Research Fund Association, the following details are of interest. In the first place, the cost of the maintenance of the Nutrition Research Laboratory at Coonoor with its staff of 11 qualified research workers, about half of whom are medical men and the others chemists and biochemists, amounts to over Rs. 82,500 per annum. Six other grants for nutritional research include one to the department of Biochemistry and Nutrition in the Calcutta All-India Institute of Hygiene and Public Health and three to University workers, whilst their total annual cost amounts to over Rs. 18,000. In addition, and in order to implement the recommendations of the Nutritional Advisory Committee, the I. R. F. A. have earmarked a sum of Rs. 1·5 lakhs for the additional activities outlined in previous paragraphs. It has been decided to spread the expenditure of this sum over a period of five years in order to ensure some degree of continuity of work. The average additional expenditure will therefore be approximately Rs. 30,000 per annum. During the past decade, the total amount devoted to nutrition work has approximated to Rs. 1 lakh per annum and for the next five years will reach a figure of Rs. 1·3 lakhs per annum.

In the report of a dietary survey recently carried out in England under the auspices of the Medical Research Council, the authors express the opinion that " the main causal factor of inadequate diets in many households is ignorance of how to buy, what to buy, and how to use to the best advantage the material bought ". And they go on to ask the question, " How can things be improved? " They disagree with " those who imagine that they can alter the dietary habits of the people by direction or dictation. . . . . It is not dictation but education which is required. " If that be the case in England, is it

not much more so in this country? What are the methods to be adopted to educate the people in correct dietary habits? How are the facts obtained from these dietary surveys to be got across to the persons concerned? A certain amount of educational work by means of pamphlets and posters, etc., is being carried out by public health departments and by charitable bodies such as infant welfare associations, the Indian Red Cross Society, etc. But much more remains to be done in this direction before it will be possible to bring to the notice of the average town dweller or villager the practical results of scientific research and to get him so to adjust his diet as to give him the best value for his expenditure on food materials.

Yellow Fever.

156. The danger of the introduction of yellow fever into India has been a subject of concern to its public health authorities for many years, but with the development of air traffic the question has become one of urgent importance. During more recent times, the Government of India's representative at the meetings of the Office International d'Hygiene Publique in Paris has unfailingly impressed on his fellow delegates the grave view which his Government take of the potential danger and the Government of India's attitude has been abundantly justified by recent events. In the first place, during 1936 a new air route has come into operation between Lagos and Khartoum where it links up with the Capetown-Cairo route. There is therefore the possibility of infected persons and mosquitoes being carried from endemically infected areas in West and Central Africa to India within the incubation period of the disease. In the second place, it has been shown that " an endemic type of yellow fever could occur, and did occur, in districts where there were no *Aedes aegypti* (stegomyia) mosquitoes ". " The *Aedes aegypti* is no longer the sole villain of the piece. There is another unknown villain, or villains, and perhaps other hosts to the disease than man. Vast areas of the hinterland of both South America and Africa are endemic centres of the disease. " This new variety of yellow fever, called " jungle yellow fever ", chiefly affects workers on the land and is not contracted in houses, so that it is distinct from the urban type of the disease ordinarily contracted in dwelling houses. There seems little doubt that human beings are not essential to continuance of the endemicity nor to spread of this new type. As Col. James, President of the Yellow Fever Commission of the Office International, remarks it would seem that jungle yellow fever in man is an accidental occurrence in the course of an epizootic among lower animals; this is confirmed by the fact that monkeys in widely separated endemic areas in South America have been shown to possess an acquired immunity to yellow fever infection.

Recent laboratory findings have demonstrated that the yellow fever virus can be transmitted from monkey to monkey by a widely distributed genus of mosquito, certain species of which have been observed to attack man viciously in districts of jungle fever endemicity. Moreover, the new jungle yellow fever virus has been transmitted from monkey to monkey by the *Aedes aegypti* mosquito, the most important urban vector of the disease. If, as all recent work indicates, the virus of jungle yellow fever is identical with that of the urban type of the fever, the position in India is that, in addition to the immense human reservoir for the virus, there exists a vast monkey reservoir which could by no practical means be eliminated or controlled. This new knowledge makes it all the more necessary to take every possible measure, however stringent, to prevent introduction of the yellow fever virus to this country.

In regard to Africa, which is of primary interest to India in view of the rapid development of air traffic, during 1935 cases of yellow fever were notified

in French Equatorial Africa, the French Colonies of Dahomey, Ivory Coast Niger, Senegal, Sudan and Togoland and cases also occurred in the British Colonies of the Gambia, Gold Coast, Nigeria and Sierra Leone. Further cases were reported from the Gold Coast in 1936. The immunity survey by the International Health Division of the Rockefeller Foundation, undertaken largely as a result of the Pan-African Conference held at Capetown in 1932, was completed in 1935. It has shown that in Africa immunity to yellow fever among human beings is widely distributed over a region extending from the coast of Senegal eastwards for 3,300 miles to the upper reaches of the White Nile in the Anglo-Egyptian Sudan. Positive mouse protection tests have been obtained in Egypt, the Anglo-Egyptian Sudan and in Uganda, suggesting the presence of sporadic infection in the surveyed tracts. In the south-western area of the Anglo-Egyptian Sudan, considerable numbers of persons are shown to have acquired immunity to yellow fever and the western and north-western parts of Uganda are definitely within the area of recent infection. Further, mouse protection tests done on monkeys make it almost certain that the same epidemiological factors exist in Africa as have been found in South America. The danger of yellow fever reaching the east coast of Africa has, therefore, been considerably enhanced and as the stegomyia mosquito is to be found freely breeding all along that coast, the disease may reach India by sea as soon as any of the East African ports are infected. The fact is that the stegomyia mosquito is also ubiquitous round the coastal regions of India, although it is only fair to add that in a few of the larger ports, such as Bombay and Karachi, anti-stegomyia campaigns have been instituted and regular checks are being made to determine the degree of infestation of harbour areas, shipping, etc., in these ports. Although the air-port of Karachi and the neighbouring cantonment and its surrounding areas are remarkably free from stegomyia, in the Karachi harbour area the recorded index has been as high as 10 % in January, 11 % in February and 9 % in May, 1937. Similarly, high stegomyia indices continue to be reported amongst the country craft using Bombay harbour. In view of the increasing proximity of infected areas to India, both in time and space, more sustained effort to stamp out this dangerous vector must obviously be made.

The questions of stegomyia eradication and control of air traffic have received studied attention from all African Governments whose territories lie along the air route between Capetown and Alexandria. In the Sudan, all aircraft are examined and sprayed on entry and departure at the frontier aerodromes and stringent anti-mosquito measures are taken in all towns situated near the aerodromes used for international traffic. In Kenya, routine disinfestation of all planes arriving at Kisumu, Nairobi and Mombasa is being carried out, whilst these aerodromes are being kept as mosquito-free as possible. In Cairo and Alexandria, also, every machine on arrival from the south is thoroughly fumigated before it is allowed to proceed. The Egyptian Sanitary and Maritime Quarantine Board have agreed to do their best to ensure proper disinsectisation of all machines flying from Central Africa to Karachi and to prevent passengers from embarking at Alexandria for India if they can arrive there within less than nine days from possible exposure to infection. Even so, on more than one occasion air passengers have reached Karachi within the 9 days period and it is fortunate for India that none of these persons developed the disease.

In order to provide further safeguards for this country, the Government of India in June and September, 1936, issued notifications, under the Epidemic Diseases Act, which forbade the entry into India of any aircraft which

had started from or alighted in a yellow fever endemic or 'silent' area except such aircraft which have obtained at Alexandria or Cairo a certificate of disinsectisation with 'Pyrocide 20' in the manner prescribed. These notifications also prohibited the entry into India of a passenger or a member of the crew of an aircraft within 9 days of his having been in an endemic or 'silent' area, unless he were protected by inoculation or by a previous attack of yellow fever. The prohibition period of 9 days is 3 days longer than that laid down in the Aerial Navigation Sanitary Convention, but this extended period was fixed in order to cover both the 6 days incubation and the first 3 days of infection during which a patient is infective. As it is known that the incubation period in certain cases may be as long as 13 days, it cannot be argued that the regulations in force in India are in any way too strict.

Following the issue of the Government of India notifications, all aircraft coming from South Africa, before leaving for Karachi, are now fumigated at Cairo or Alexandria with 'Pyrocide 20', which experimentation had shown to be the most satisfactory fumigant for the destruction of mosquitoes, and the certificates of fumigation granted at these ports are examined on arrival of the aircraft at Karachi. As the majority of the aircraft crews of aircraft coming from Central Africa are still non-immunised to yellow fever and as these individuals might infect mosquitoes entering the planes at intermediate ports of call, fumigation at Karachi is in force for all such machines; it is not proposed to abolish this preventive measure until the position becomes easier than it is at present.

Informal arrangements have been made with the Director of the Egyptian Maritime and Sanitary Quarantine Board to keep the Airport Health Officer at Karachi informed by cable of the possibility of a passenger reaching India by Air from infected or suspected areas in Africa within the 9 days period. This arrangement is all the more necessary, as the quarantine block for the detention and isolation of such persons at Karachi airport is not yet complete. It also enables the Karachi Airport Health Officer to intimate to the health authorities of the ports of disembarkation on the air route through India, the arrival of a suspected person.

The Government of India have also framed rules for the sanitary control of Indian aircraft, which are based on the provisions of the International Sanitary Convention for Aerial Navigation. They have taken steps to enable medical officers, particularly those belonging to the Public Health and Medical Research Departments, to be immunised against yellow fever while they are on leave in England, whilst Officers of the Medical Research Department are to have the opportunity of learning the method of administering the yellow fever vaccine. In addition, the Government of India have now arranged to stock in Bombay small supplies of vaccine which would be available at once should any emergency unfortunately arise. By these several measures, it is hoped that catastrophe will be avoided and that, if by some mischance infection reaches India, properly immunised medical officers will be available to carry out the necessary further preventive measures.

It must be remembered that the whole responsibility for the preventive campaign does not rest on the shoulders of Government. Port Trust authorities, municipal councils, local boards and individual householders must all play their part in the attempt to eradicate the stegomyia vector of this deadly disease. With co-ordination of effort, the danger can be reduced to infinitesimal proportions and may, it is hoped, be entirely avoided.

Drug Adulteration.

157. Following the adoption of a resolution in the Council of State in 1927, a Drugs Enquiry Committee, under the chairmanship of Colonel Chopra, I.M.S., was appointed in 1930 by the Government of India. This Committee submitted an exhaustive report on the whole question of the control of the import, manufacture and sale of drugs and medicines in India. The main conclusions reached by the Committee were that drugs and medicines, whether imported or manufactured in this country, were subject to considerable adulteration and that in order to secure effective uniformity, central legislation was required for the setting up of suitable standards. Local Governments were consulted in regard to the numerous recommendations made in the Committee's report, but while there was general acceptance of the recommendations, the general financial stringency of the time prevented their active collaboration. The whole question was once more discussed in the Council of State during 1935 and the general opinion was that the conclusions of the Drugs Enquiry Committee should be implemented as soon as possible. The Government of India, recognising the seriousness of the situation, again impressed on Local Governments the need for action and enquired whether, in view of the urgency of the problem, they would be prepared to take further action. The establishment of a Central Drug Testing Laboratory was also made the subject of reference.

A number of provincial Governments considered that little could be done in the absence of Central legislation which would prescribe common standards for drugs and medicines and suggested that this was the first step to be taken. This proposal was carefully examined but for various reasons it was found impossible to carry it through.

In March, 1935, the League of Nations Health Organisation drew the attention of States Members' Governments to the fact that the work carried out by its Permanent Commission on Biological Standardisation had enabled the latter to recommend the adoption of international standards for a series of products, the assay of which could only be effected by biological methods. An Inter-Governmental Conference on the subject was held in May 1935, at Geneva, the Government of India being represented by their Public Health Commissioner. After three days' discussion, the Conference adopted a number of resolutions which are detailed in Section V of this report. In connection with the resolution recommending the setting up of national centres in each country, the Nutrition Laboratories at Coonoor and the Pharmacology Department of the Calcutta School of Tropical Medicine have been used for some time past as centres for the standardised vitamins and standardised hormones and drugs respectively, so that the Committee's proposal was no innovation in this country. The suggestion has been made that the Central Research Institute, Kasauli, should be the national centre for standardised sera, etc., and when that suggestion has been accepted, India will have adopted in full the recommendations made by the Biological Standardisation Committee on this question.

As a first step towards the effective control of drugs and medicines in India, the Government of India have sanctioned the establishment of a Biological Standardisation Laboratory under the direction of Brevet Colonel Chopra, I.M.S. This laboratory was opened in March, 1937, being housed for the time being in the All-India Institute of Hygiene and Public Health in Calcutta. The Report of the Drugs Committee recommended that the Central Laboratory should be located in a centre (*a*) where the drug industry was progressing; (*b*) which was a centre of drugs import and distribution; and (*c*) where drugs

were actually being used on a large scale. The establishment of the new laboratory in Calcutta complies with all these recommendations. Bio-assay and pharmaceutical sections have been provided and the technical staff which includes a pharmacologist, a senior experimental assistant, a pharmaceutical chemist and a biochemist has started its work. The authorities of the National Institute for Medical Research and the Medical Research Council, London, have been generous in their offers of assistance to and collaboration with the new Drugs Control Laboratory in Calcutta. The work of this laboratory will no doubt in due course indicate the lines on which further advance is necessary.

It will probably be necessary to open later on a further section for the testing of sera and vaccines; evidence already shows that these substance require a degree of control which does not yet exist in this country. But the Drugs Enquiry Committee at no time considered that the whole of their control scheme should be started at once. An institution of this kind must be allowed to develop gradually and a period of 3-5 years will probably be necessary before a complete scheme can be put into full working order.

It must be remembered, however, that one of the essential parts of the scheme is the development of a suitable laboratory in each province, as these will play an important part in the evolution of the Central Government's laboratory. Under the new Constitution now in force in India, the control of drugs is vested in provincial Governments and it is to be expected that these Governments will find it necessary to establish their own laboratories for this purpose. At the same time, it will be necessary to evolve some arrangement by which co-ordination will be effected between these provincial laboratories and the Central Government's laboratory.

The Drug Enquiry Committee's report visualises that the Central Laboratory will undertake commercial testing of drugs for manufacturers and dealers on payment of fees. It is understood that the laboratories of the Pharmaceutical Society of Great Britain, where drugs are tested for the drug control authorities, undertake work of this kind for private manufacturing firms and it would seem that the Government of India's laboratory might well do the same. In a country like India, where the drug manufacture industry is still in its infancy, the expert advice available in the Central Laboratory would be of great assistance in the development of the industry. Many of the manufacturing firms in India have not at present the means for proper testing and standardisation especially where biological method of assay are involved and are, it is believed, experiencing considerable difficulties in having their products standardised. This question therefore is one of considerable importance and deserves further examination.

The Quetta Earthquake.

158. The earthquake which occurred in Baluchistan on the early morning of 31st May, 1935, and which lasted for little more than 30 seconds, destroyed the whole of Quetta city and a number of villages lying over a considerable tract of country and caused considerable damage to the Quetta cantonment. No less than 40,000 persons lost their lives of which by far the greatest proportion was killed in Quetta, whose population was at the time probably in the neighbourhood of 66,000. Fortunately, the troops living in the neighbouring cantonment were immediately available for rescue work and the Army Commander was able to take over administrative control of the whole area. This was the more essential as nearly the whole of the civil police force had been killed or injured. With the help of the troops all injured persons lying

in the ruined city were speedily rescued, over 2,500 dead were removed, whilst arrangements for the evacuation of sick, wounded and refugees were quickly made as the railway had not been seriously damaged. By the 14th June, 31,500 persons had been despatched by rail, but there remained about 5,000 refugees who were housed in tents on the Quetta race course, about 3,500 persons in temporary railway camps and a few hundreds camping in the civil area.

It was estimated that about 12,000–16,000 human bodies lay buried in the ruins of the dead city and these figures alone give a clear idea of the serious health problem which the catastrophe presented.

The military medical authorities had laid the foundations of a sound public health organisation both in the refugee camp and in the occupied civil areas before additional health staff could be obtained from civil sources but, by the 15th June, 9 district medical officers of health from the Punjab, a number of sanitary inspectors and additional sweepers were at work, along with a Sanitary Company provided by the military authorities. The whole public health organisation for the civil areas was placed in charge of Major (now Lt.-Col.) Nicol, I.M.S., Assistant Director of Public Health, Punjab, and he remained in charge until October by which time the danger of untoward epidemic outbreaks was over.

During the first few weeks, the work of organisation proceeded at high pressure. Within 24 hours a piped water supply was provided for the refugee camp; in outlying villages water supplies were chlorinated or otherwise treated. In the refugee camp, suitable hospitals for men and women were quickly organised, whilst an infectious diseases hospital was erected 2½ miles outside the city area, although this was fortunately not required. Within a few days, every refugee was vaccinated against smallpox and inoculated against cholera. Milk supplies were abundant almost from the first day and all necessary medical and sanitary stores and equipment were supplied at first by the military authorities. Within a week of the earthquake, every possible health precaution had been satisfactorily completed and it is a matter for profound satisfaction that neither among the civil nor the military population in the stricken area did any outbreak of disease occur. In fact, the army medical authorities have stated that at no period for which they have records has the health of Quetta cantonment been so satisfactory as during the months following the earthquake. The fact is, of course, that at no period in the history of Quetta has there ever been maintained such a high standard of sanitation.

One of the most urgent problems facing those who took over emergency control of the civil areas lying round the ruined city was the disposal of bodies and carcasses which quickly began to decompose and cause offence from smell and from flies. Bodies and carcasses which were totally or partially exposed were speedily removed, but many of those even deeply buried soon caused a menace to health which had to be dealt with at once. Even with the protection afforded by gas masks and thick leather gloves those who undertook the urgent work of exhumation and removal were given a gruesome and repulsive task, but by the 16th June the occupied areas within a 3 mile radius of the civil areas were cleared of all bodies causing an immediate nuisance. On the advice of the Public Health Commissioner, the Government of India decided to proceed at once with the salvage of the ruined city, section by section, and within fifteen months the whole of the debris had been removed,

over 9,000 human bodies being discovered during the clearing process. This work was carried out in such a way as to cause no danger to the health of those living in the proximity of the city. In April, 1936, a section of the city was reopened for occupation and within a very short space of time, 27,000 people were once more living in Quetta in temporary one storey buildings laid out according to plans drawn up by the civil authorities. These temporary structures were in certain health respects not all that could have been desired, but a return of the people to their city and the opportunity of resuming their occupations and of finding employment were considered to be important psychological factors which outweighed all others at the time. It is hoped that in time more permanent and better houses will take the place of the present temporary erections.

For several years before the earthquake, the high incidence of malaria among the civil and military communities in Quetta had been a matter of considerable concern to the local authorities. Immediately prior to the earthquake, an officer of the Malaria Survey of India had made a preliminary reconnaissance of the malaria problem in order to advise as to the steps which should be taken to ameliorate conditions. The destruction of the city and part of the cantonment changed the whole position and the opportunity was taken to point out that, in considering the programme of reconstruction, due regard should be paid to the malaria problem. A malaria survey unit was accordingly sent to Quetta in July, 1935, and this unit was able to determine the local malaria carrying mosquitoes, to obtain information as to their habits and breeding places and to map out the distribution of malaria in Quetta and its immediate environments. A complete report was prepared and was made available to all those concerned with the reconstruction of the city and the cantonment; it remains to be seen whether or not the recommendations contained in that report will receive the consideration they deserve.

Quetta had for long been known as an endemic centre for oriental sore, which had periodically caused a considerable amount of sickness both in the military and civil communities. The masses of dry debris in the ruined city offered very favourable conditions for the breeding of sandflies in large numbers, whilst the breeding season lies between May and September. It is not surprising, therefore, that during 1935 there occurrred a greatly increased prevalence of oriental sore. During 1936, the disease assumed epidemic proportions and in March of that year, a total of 760 cases were reported of which 450 occurred in the civil population, 54 among employees in the cantonment, 220 among the Indian troops and 36 among the British troops. A research unit was sent to Quetta in April, 1936, to investigate conditions and it was able to advise as to precautionary measures although, until the city was cleared, effective control was found to be more than difficult.

Nothing need be added here to what has already been said of the courage and heroism displayed by all who took part in the rescue, organisation and reconstruction work carried out in the devastated area; these were beyond all praise. This note is merely intended to give a brief outline of the difficult and unusual public health problems presented in the earthquake area and to indicate that these were solved in a manner entirely satisfactory not only to those responsible for their solution but to those for whose benefit and protection they were instituted. Those who took part in the work no doubt gained new experience in preventive medicine; none, it is hoped, will ever be called upon to reapply that experience.

Organisation of Provincial Public Health Departments.

159. In the early days of the development of modern medicine in India, as in other countries, prevention of disease received little attention, except perhaps as regards vaccination against smallpox. Indeed, few even of the members of the medical profession had what may be called the " preventive " outlook, and because of the recognised urgency of the need to provide medical treatment for the sick and suffering, effort and money were concentrated on the establishment of hospitals and dispensaries. By the time the importance of public health work came to be reaslied, " the physicians and surgeons were already strongly entrenched so that public health workers found it difficult to awaken any enthusiasm for preventive medicine amongst the administrative medical officers ". (Megaw, 1933).

" The position is now very different. The prevention of disease has come to be universally recognised as being the chief aim of medical work. " (Megaw 1933). As a result of the general change in outlook which has for the most part developed since the Great War, various provinces in India have since 1919, re-organised their Public Health Departments on a more satisfactory scale than was previously considered either possible or even necessary. But even in those provinces where considerable developments in the field of public health have been carried through, the allotments for public health activities in both provincial and in municipal and local board budgets are still much smaller than they ought to be. As a result, Directors of Public Health are severely handicapped in their endeavours to make progress. Until the existing deficiencies in public health budgetary allotments are corrected and public health development is more generally recognised to be the primary need of the people, it will not be possible to effect those improvements which are of such vital importance to the people of this country.

One of the first steps necessary for effecting improvement in the public health is the organisation of provincial Public Health Departments and the adoption of schemes whereby the supply and employment of trained Medical Officers of Health for municipal and district work can be assured. Little improvement can be expected unless Governments and local bodies provide themselves with trained personnel capable of advising on health problems and of supervising the execution of Government and local health activities both of which are so intimately associated with the welfare, happiness and prosperity of the people.

In order to throw light on the present day position, in the first place the attempt has been made to collect details from every province of India in regard to the numbers of trained health officers now employed in these areas. The following tabular statement incorporates the latest information in regard to both municipalities and districts. It indicates clearly the comparative position of the individual provinces and the wide differences which exist. It shows, for instance, that nearly half the districts and three-quarters of the municipalities in India have no qualified health officers. It also shows that, whilst a few provinces are to some extent reasonably well equipped in this respect, in others no trained health personnel has been appointed except in one or two of the large cities.

Numbers of Health Officers employed in rural areas.

(Information extracted from Provincial Public Health Reports for 1935.)

	Holding D. P. H. or equivalent degrees.		Licentiates. L. P. Hs.		No. of districts.	Districts employing M. O. Hs.	Districts without M. O. Hs.
	Whole time.	Part time.	Whole time.	Part time.			
Punjab . . .	28	...	...	...	29	28	1
Sind . . .	...	...	1	...	8	1	7
U.P. . . .	40	...	29	...	48	32	16
Bihar . . .	12	...	...	...	16	...	...
Orissa . . .	3	...	1	...	8	4	4
Bengal . . .	25	...	...	...	26	25	1
Assam . . .	...	...	...	...	13	...	13
Bombay . . .	1	...	1	...	20	2	18
C. P. . . .	...	...	...	...	19	...	19
Madras . . .	28	...	18	...	24	24	...
N.-W. F. P. . .	...	...	...	...	5	...	5

Numbers of Health Officers employed in urban areas, excluding Bombay, Madras and Calcutta cities.

(Information extracted from Provincial Public Health Reports for 1935.)

	Holding D. P. H. or equivalent degrees.		Licentiates L. P. Hs.		No. of Municipalities.	Municipalities employing M. O. Hs.	Municipalities without M. O. Hs.
	Whole time.	Part time.	Whole time.	Part time.			
Punjab . . .	15	7	1	18	111	13	98
Sind . . .	7	...	...	...	6	4	2
U. P. . . .	21	...	13	...	85	34	51
Bihar . . .	5	2	...	...	55	7	48
Orissa . . .	2	...	1	...	8	3	5
Bengal . . .	24	...	...	...	117	24	93
Assam . . .	1	...	10*	...	26	11	15
Bombay . . .	10	...	7	...	150	17	133
C. P. . . .	2	...	1	...	74	3	71
Madras . . .	26	...	29	...	80	55	25
N.-W. F. P. . .	1	...	...	...	7	1	6

*L. M. Ps.

As regards Civil Surgeons or District Medical Officers most of these officers have little time to spare from their medical duties, but in many parts of the country they continue to act as health advisers to district and municipal authorities in the absence of qualified health officers. But district and municipal health work requires constant supervision and inspection and this

can only be given by a full-time officer free to tour at all times. This is not to deny that the civil surgeon requires to possess the preventive outlook, because co-operation between the medical and health personnel is essential if the best value is to be obtained from each. The time has come indeed when greater co-ordination of effort between the medical and public health departments should be effected and this can be arranged not only by closer association between the heads of the two departments at headquarters but by mutual assistance rendered by the personnel of each department to the other in the mufassil areas.

Reverting to the appointment of district health personnel, the objection has been made that many district boards are too poor to provide for a qualified health officer and the necessary subordinate staff. When it is remembered that the average annual expenditure on public health in most districts amounts only to one or two annas *per capita*, it is difficult not to believe that this vital preventive service is gravely neglected in comparison with others for which local authorities are responsible and that some re-arrangement of budgetary allotments would make it possible in most cases to find the necessary money.

It may be suggested that Local Governments have had difficulty in finding medical officers willing to take up a public health career, but the real difficulty has been that, with few exceptions, little inducement to take up public health work has been offered to young medical graduates, either in the form of suitable emoluments or of security of tenure. The result has been that the best students have specialised in other subjects even when their initial preference was for preventive medicine.

In actual fact, where a Local Government has, by one method or another, encouraged the appointment of municipal and district health officers, no difficulty has been experienced in obtaining suitable candidates for these posts. As soon as it became evident that the policy of the Government was to expand public health activities, it was possible each year to recruit for public health training the best men passing out of the medical colleges, and, within a few years, more well qualified men were available than could be given appointments.

This question may perhaps be looked at from another point of view, namely, that of unemployment which is a problem facing particularly the educated classes. It is a well known fact that a large proportion of young medical graduates crowd into the larger urban centres, there competing for such private practice as exists. It is also well known that many of these practitioners fail to earn even a modest competence. The Sapru Unemployment Committee's Report in its chapter dealing with medical graduates states that Public Health Departments " can provide scope for the employment of a fairly large number of educated men ". No public health officer with experience of conditions in India is likely to disagree with that statement and the figures already quoted supply ample confirmation of that opinion. Directors of Public Health of most of the provinces of India have for years past been pressing their Governments, mostly in vain, to plan and legislate for expansion of public health personnel, whilst within more recent times public opinion has begun to impress on Governments and local authorities the importance of expanding their health activities.

Whilst most Local Governments have, as already remarked, got suitable public health staffs at headquarters, in many of the provinces little or

no progress has been made in providing trained municipal and district health officers because Provincial Governments have been reluctant to interfere with local administration and because Municipal Councils and Local Boards have largely failed to appreciate the need for trained health advisers. At the same time since 1920 a few Provincial Governments, by means of legislation, grants, etc., have been able to effect remarkable progress in the development of urban and rural health organisations and have not only been able to provide congenial employment for considerable numbers of medical graduates and other educated young men, but have laid the foundations at least of a structure essential for the protection of the populations under their control.

One interesting feature to which notice must be drawn is the advance made in nearly every province of India within recent years in respect of public health legislation ; details will be found in Section XII of the Public Health Commissioner's report for 1933. It may perhaps be taken for granted that public opinion was in favour of these legislative advances, but legal enactments require to be applied if they are to have the intended effect. In order to make the best use of public health legislation, it is therefore necessary to have trained health officers capable of advising when and where to use the force of law and equipped with the necessary delegation of powers to carry that law into effect. Previous paragraphs have shown how inadequately Local Self-Government authorities have provided themselves with the trained officers required for these purposes.

A number of other points with a direct bearing on this question deserve comment. In some provinces the Local Governments concerned have taken powers (*a*) to form provincial Public Health Services, (*b*) to compel municipalities and district boards to appoint medical officers of health, and (*c*) to lay down conditions for the recruitment, qualifications and terms of service of all health officers. Under existing legislation, other Local Governments seem to possess few such powers and it is perhaps correct to state that it is exactly in these provinces where progress has been least satisfactory. It is particularly desirable that Governments should lay down minimum qualifications for health officers' posts and it is satisfactory to note that this has been done in a number of provinces. Nothing can be more detrimental to progress than to appoint unqualified persons to technical posts of the kind and unfortunately this is not unknown even at the present day in more than one part of India.

If Medical Officers of Health are to be of real value, they must also be given some security of tenure. Experience in England showed that failure to provide such security was always a severe handicap to ordered advance in public health and India has already proved to be no exception in this respect. Instances could be quoted where Health Officers have been unable to retain their appointments for more than short periods because, as soon as they reported on glaring sanitary defects, vested interests represented on the Municipal Councils or Local Boards rendered their position intolerabe. In order to prevent the development of such a situation, in other countries it has been found necessary to pass legislation making it illegal for municipal councils and local boards to dismiss an approved health officer without the sanction of Government. In a number of the provinces of India, Local Governments have already laid down this condition, so essential to progress, but the information supplied shows that, in other provinces, local authorities possess unfettered control over their officers.

In Madras Presidency a Government Public Health Service has been formed consisting of 1st class and 2nd class health officers, who are required to possess certain minimum qualifications before they are recruited. All municipal and district board health officers' posts are filled from the Government cadre, but always in consultation with the local authorities. This system not only ensures a suitable supply of trained officers but provides the necessary security of tenure to those officers. In the Punjab and the United Provinces, similar schemes have been partially introduced. It may be thought that this system savours too much of centralisation, but in practice it has proved eminently satisfactory and there has been no friction with the local bodies concerned. An additional advantage of a Government Public Health Service is that it is easy to obtain trained officers for special lines of public health work such as anti-malaria schemes and tuberculosis and leprosy activities. This method has been adopted in Madras, the Punjab and the United Provinces with considerable benefit to all concerned.

Several Local Governments have adopted the practice of paying a percentage, at least, of the salaries of the health officers employed by Municipal Councils and Local Boards. In other provinces no such practice exists and in those areas little or no progress has been made. Schemes under which percentage grants are given for different public health purposes have proved of great advantage in many countries of the world and there seems no reason to think that similar schemes would fail to produce equally good results in India. Whatever system of public health organisation may be evolved,—and there is no necessity for rigid uniformity in this respect,—the offer by Government of percentage grants not only encourages development but permits of a degree of control over expenditure not always easily obtained otherwise and over conditions of service already shown to be essential.

Finally, mention must be made of the question of delegation of executive powers to municipal and district health officers. In all provincial, municipal and local boards Acts, there will be found sections under which it is permissible for Chairman and Executive Officers to delegate certain powers. These sections doubtless find a place in the Acts because of the practical convenience which such delegation gives in day to day administration. In some provinces, the powers which may be delegated to health officers are both numerous and wide, in other cases they are definitely restricted in extent. But in actual practice, for one reason or another, Chairman and Presidents have apparently been reluctant to delegate these powers to the officers serving under them and it is significant that, in one province it has been reported that seldom if ever does this occur. In order to do successful work, the health officer should for instance, normally have full control over his subordinate staff. Unfortunately, few health officers are given that control, much less the power to proceed under other sections of the Municipal or District Boards Acts. It should be evident that to get full value from a trained health officer and to save time otherwise spent in making petty references to a Chairman or President, the delegation of powers permitted by the Acts should be freely exercised.

These paragraphs will have indicated that wide variations exist between the provinces in regard to public health staffs, although it may be added at once that variations are not *per se* necessarily undesirable. At the same time, in certain instances, existing conditions would seem to be distinctly unfavourable to the satisfactory development of the public health services

of the provinces in which they occur and considerable amendments are required before reasonable progress can be achieved. The whole question of improvement of public health organisations is urgent, not only because of the poor state of the public health in India, but because in the near future public opinion will almost certainly compel Governments and local bodies to devote additional funds for the promotion of measures intended to improve existing health conditions. The subject is one which deserves serious consideration from all concerned.

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Public Health Commissioner with the
Government of India.

SIMLA.

The 12th June 1937.

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Appendix I

relating to

Section I.

TABLE A.—ESTIMATED POPULATION ON 30TH JUNE, 1935 IN RURAL AND URBAN AREAS AND BY SEX.

	Rural.	Urban.	Total.	Male.	Female.	Area in square miles.	Density per square mile.
BRITISH INDIA . .	249,032,073	29,167,472	278,199,545	143,328,624	134,870,921	890,116	312
N.-W.F.P. . . .	2,128,814	329,753	2,458,567	1,328,212	1,130,355	13,308	185
Punjab	21,706,734	3,315,319	25,022,053	13,618,845	11,403,208	96,614	259
Dēlhi	206,797	465,773	672,570	388,735	283,835	578	1,164
U.P.	45,207,003	5,691,210	50,898,213	26,743,714	24,154,499	106,248	479
B. & O.	37,879,006	1,448,743	39,327,749	19,608,980	19,718,769	83,054	473
Bengal . . .	47,710,285	3,521,148	51,231,433	26,626,896	24,604,537	72,514	706
C. P.	14,597,570	1,762,416	16,359,986	8,171,991	8,187,995	99,920	164
Bombay	18,562,150	4,330,908	22,893,058	12,027,991	10,865,067	123,069	186
Madras	41,186,663	6,481,519	47,668,182	23,606,935	24,061,247	142,277	335
Coorg	155,225	9,565	164,790	91,287	73,503	1,593	103
Assam . . .	8,072,165	204,934	8,277,099	4,360,846	3,916,253	31,382	264
Burma	11,222,444	1,426,672	12,649,116	6,448,677	6,200,439	116,848	108
Ajmer-Merwara . .	397,217	179,512	576,729	305,515	271,214	2,711	213

Table B.—Estimated Population by Sex and Age.

	N.-W. F. P.		Punjab.		Delhi.		U. P.		B. & O.		Bengal.		C. P.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
Under 1 year	39,373	37,361	469,075	462,378	10,669	10,580	785,897	788,306	479,482	488,695	848,940	851,930	282,860	289,564
1—5 years	162,078	157,795	1,549,540	1,489,289	36,125	35,417	3,054,106	3,081,822	2,372,746	2,507,114	3,083,017	3,170,982	968,090	1,016,974
5—10 years	188,857	153,630	1,788,278	1,547,914	41,416	35,181	3,411,958	2,943,676	2,757,508	2,537,785	3,642,691	3,231,938	1,050,866	1,015,684
10—15 years	168,570	127,089	1,661,634	1,363,593	41,749	33,384	3,162,014	2,580,108	2,402,172	2,134,334	3,187,149	2,846,620	950,987	900,015
15—20 years	116,936	100,129	1,272,415	1,051,646	41,774	30,822	2,421,107	2,118,896	1,631,778	1,692,632	2,333,008	2,599,977	719,773	756,193
20—30 years	228,720	215,943	2,361,353	1,983,433	85,803	57,834	4,776,596	4,408,255	3,357,742	3,573,709	4,877,302	4,861,080	1,449,168	1,479,292
30—40 years	182,641	153,742	1,773,607	1,390,247	63,244	37,363	3,871,170	3,456,837	2,831,730	2,858,514	3,943,713	3,157,181	1,137,536	1,112,485
40—50 years	115,674	93,041	1,223,074	968,245	37,068	22,091	2,700,653	2,344,215	1,945,904	1,891,724	2,492,816	1,936,510	815,098	764,489
50—60 years	69,539	53,411	804,842	613,641	18,707	12,472	1,553,522	1,412,916	1,116,132	1,148,554	1,330,466	1,136,222	472,030	468,322
60 years and over	55,824	38,214	715,027	532,822	12,180	8,691	1,006,691	1,019,468	713,786	885,708	887,794	812,097	325,583	384,377

	Bombay.		Madras.		Coorg.		Assam.		Burma.		Ajmer-Merwara.		Total.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
Under 1 year	339,122	341,040	658,337	676,665	2,144	2,209	144,025	110,294	162,847	172,973	9,569	9,633	4,232,340	4,241,628
1— 5 years	1,356,383	1,374,698	2,742,866	2,815,863	7,600	7,747	224,989	165,088	683,450	712,528	34,054	34,280	16,275,044	16,569,597
5—10 years	1,558,707	1,401,950	3,095,074	3,025,480	9,602	9,182	413,132	291,407	786,966	777,715	37,568	33,017	18,782,623	17,004,559
10—15 years	1,395,603	1,204,286	2,846,442	2,695,479	10,072	9,054	651,699	493,974	735,387	711,735	35,500	29,927	17,248,978	15,130,198
15—20 years	1,050,692	998,462	2,063,852	2,206,513	9,201	7,588	774,515	753,793	599,114	621,551	30,507	26,832	13,064,672	12,965,034
20—30 years	2,211,191	2,053,575	3,960,818	4,546,279	19,772	15,396	359,771	398,841	1,187,492	1,141,013	57,028	49,245	24,932,756	24,783,895
30—40 years	1,867,875	1,510,883	3,360,558	3,331,708	16,467	10,418	501,393	447,372	943,152	796,719	41,186	35,837	20,534,272	18,299,306
40—50 years	1,176,714	979,565	2,355,735	2,216,940	9,452	5,985	589,729	534,349	619,412	553,863	32,585	26,719	14,113,914	12,337,736
50—60 years	650,392	584,000	1,428,226	1,411,352	4,453	3,482	564,065	582,321	403,795	389,813	18,239	15,380	8,434,408	7,831,886
60 years and over	421,312	416,608	1,095,027	1,134,968	2,524	2,442	137,528	138,814	327,062	322,529	9,279	10,344	5,709,617	5,707,082

TABLE C.—BIRTHS IN RURAL AND URBAN AREAS.

	Rural.	Urban.	Rate p. m. Rural.	Rate p. m. Urban.
BRITISH INDIA	8,752,220	946,574	34·9	34·5
N.-W. F. P.	65,420	10,572	31	32
Punjab	947,371	121,767	44	37
Delhi	9,174	19,687	44	42
U. P.	1,501,367	243,469	32	62
B. & O.	1,274,217	31,363	34	22
Bengal	1,556,790	77,339	33	22
C. P.	616,228	80,576	42	46
Bombay	657,257	149,732	35	35
Madras	1,521,169	150,017	37	23
Coorg	3,753	426	24	45
Assam	233,516	6,382	29	31
Burma	351,904	47,869	31	34
Ajmer-Merwara	14,054	7,375	35	41

TABLE D.—TOTAL BIRTHS BY MONTHS.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.	Rate p. m.	Males born to every 100 females.
BRITISH INDIA	787,695	719,254	749,287	719,106	684,840	684,591	774,806	844,705	891,531	960,176	951,501	931,302	9,698,794	34·9	108
N.-W. F. P.	6,552	7,131	6,658	5,768	5,386	5,671	6,230	6,776	6,109	6,207	6,809	6,695	75,992	31	131
Punjab	87,637	80,065	80,982	64,755	67,209	71,935	87,069	100,533	101,084	106,833	110,491	110,545	1,069,138	43	112
Delhi	2,082	1,694	1,822	1,728	1,728	1,740	2,498	3,073	3,091	3,255	3,343	2,807	28,661	43	106
U. P.	137,533	129,718	118,674	120,997	110,745	112,533	134,834	170,501	187,740	183,716	173,363	164,477	1,944,836	34	113
B. & O.	110,588	98,822	95,950	102,079	93,594	89,796	100,200	107,662	122,433	129,820	127,460	127,176	1,305,580	33	106
Bengal	147,560	142,423	156,719	136,676	116,033	99,171	97,975	94,130	113,834	162,804	184,969	181,835	1,634,129	32	112
C. P.	52,016	46,869	55,296	54,173	49,777	48,155	56,600	70,822	73,706	70,866	61,877	56,647	696,804	43	105
Bombay	64,436	60,015	68,073	62,357	60,280	61,690	69,300	74,034	74,022	74,681	70,541	67,560	806,989	35	108
Madras	119,690	102,980	115,542	119,948	131,792	143,399	162,066	164,635	157,547	156,624	149,427	147,536	1,671,186	35	105
Coorg	299	329	412	394	355	405	388	361	343	345	271	277	4,179	25	114
Assam	25,621	20,506	18,802	17,391	15,726	14,490	15,403	16,099	17,571	24,206	26,649	27,434	239,898	29	106
Burma	31,891	27,178	28,937	31,411	30,729	34,118	40,490	34,017	31,983	38,795	34,039	36,185	399,773	32	104
Ajmer-Merwara	1,790	1,524	1,420	1,429	1,486	1,483	1,753	2,062	2,068	2,024	2,262	2,128	21,429	37	115

Table E.—Total Deaths by Months.

	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sep.	Oct.	Nov.	Dec.	Total.	Rate.
British India	547,933	449,847	479,089	531,075	573,645	549,027	530,524	565,962	597,905	590,435	579,981	583,288	6,578,711	23·6
N.-W. F. P.	5,380	4,856	3,522	3,141	3,615	4,064	3,398	3,455	3,193	3,290	3,923	3,959	45,706	19
Punjab	62,473	45,475	40,335	40,176	50,745	51,766	44,972	43,096	51,460	53,066	50,690	49,585	583,839	23
Delhi	1,627	1,242	1,385	1,636	2,178	2,015	1,574	1,496	1,671	1,594	1,599	1,293	19,310	29
U. P.	91,400	85,991	88,584	116,992	126,186	127,285	101,568	94,993	100,778	96,984	88,277	80,615	1,199,653	24
B. & O.	67,430	53,539	58,540	77,691	84,212	87,516	86,138	95,891	96,608	87,369	77,104	75,013	947,051	24
Bengal	102,600	83,298	92,747	97,420	86,901	70,561	75,727	81,573	90,061	102,549	118,266	129,724	1,131,427	22
C. P.	32,641	28,413	34,964	37,461	48,284	47,182	35,239	48,112	62,742	59,339	51,611	46,760	532,748	33
Bombay	47,450	40,846	50,766	48,511	47,027	37,545	42,988	50,919	50,774	45,595	48,620	46,478	557,519	24
Madras	100,834	78,642	79,455	73,709	88,089	84,040	97,043	107,132	104,753	100,024	101,526	109,089	1,124,336	24
Coorg	262	215	271	266	306	407	449	366	350	332	244	300	3,768	23
Assam	14,106	10,574	9,687	13,534	16,745	17,552	16,347	14,046	12,752	15,008	14,647	14,725	169,723	21
Burma	20,041	15,479	17,411	18,832	17,420	17,867	24,195	23,643	21,282	23,953	22,387	24,625	247,135	20
Ajmer-Merwara	1,689	1,277	1,422	1,706	1,937	1,227	886	1,240	1,481	1,332	1,087	1,122	16,406	23

TABLE F.—DEATH RATES *PER MILLE* BY MONTHS.

	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
BRITISH INDIA	24	19	21	23	25	24	23	24	24	25	25	25
N.-W. F. P.	26	24	17	15	18	20	17	17	16	16	19	19
Punjab	30	22	19	19	24	25	22	21	25	25	24	24
Delhi	29	22	25	29	38	36	28	27	30	28	29	23
U. P.	22	20	21	28	30	30	24	22	24	23	21	19
B. & O.	21	16	16	18	24	27	26	29	37	27	24	23
Bengal	24	20	22	23	20	17	18	19	21	24	28	30
C. P.	24	21	26	27	25	35	26	35	46	44	38	34
Bombay	25	21	27	25	22	20	23	27	27	24	25	24
Madras	25	20	20	19	22	21	24	27	26	25	26	27
Coorg	19	16	20	19	22	30	33	27	25	24	18	22
Assam	20	15	14	20	24	25	24	20	18	22	21	21
Burma	19	15	17	18	17	17	23	22	20	23	21	23
Ajmer-Merwara	35	27	30	35	40	26	18	26	31	28	23	23

TABLE G.—DEATHS BY MONTHS IN RURAL AREAS.

	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sep.	Oct.	Nov.	Dec.	Total.	Rate p. m.
BRITISH INDIA	489,562	400,488	421,633	470,184	505,169	489,640	475,949	505,691	539,008	534,889	524,829	529,223	5,886,265	2·34
N.-W. F. P.	4,772	4,422	3,108	2,686	2,988	3,454	2,856	2,893	2,725	2,884	3,427	3,537	39,752	19
Punjab	56,601	41,287	35,510	35,377	44,206	44,793	36,341	37,140	45,794	47,734	45,162	44,632	517,577	24
Delhi	610	383	420	502	595	671	448	481	623	656	679	554	6,572	32
U. P.	78,312	74,480	74,144	98,599	104,394	108,532	88,552	80,009	85,023	83,859	76,305	69,644	1,021,853	23
B. & O.	65,787	52,237	56,916	75,991	82,216	85,689	84,021	93,583	94,543	85,568	75,459	73,293	925,303	24
Bengal	95,566	76,995	86,089	91,024	80,407	65,399	69,936	75,696	84,575	96,964	112,184	123,085	1,057,920	22
C. P.	23,886	25,193	30,840	33,135	42,876	42,652	31,505	43,056	57,017	54,094	46,665	41,906	477,825	33
Bombay	36,996	31,649	39,304	37,683	36,783	29,379	34,225	40,993	41,782	36,894	39,824	37,401	442,913	24
Madras*	90,470	70,124	70,816	65,489	79,134	76,251	87,683	97,005	95,351	90,137	91,555	99,048	1,013,063	25
Coorg	217	192	233	225	271	358	406	310	307	299	208	254	3,280	21
Assam	13,769	10,277	9,452	13,245	16,394	17,160	15,937	13,738	12,423	14,682	14,284	14,457	165,818	21
Burma	16,494	12,427	13,928	15,333	13,928	14,646	20,479	20,074	17,865	20,253	18,404	20,077	204,508	18
Ajmer-Merwara	1,032	822	873	895	977	656	560	763	980	865	673	735	9,881	25

*Inclusive of figures of towns other than municipalities.

TABLE H.—DEATHS BY MONTHS IN URBAN AREAS.

	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sep.	Oct.	Nov.	Dec.	Total.	Rate p. m.
BRITISH INDIA	58,371	49,359	57,456	60,891	68,476	59,387	54,575	60,271	58,897	55,546	55,152	54,065	692,446	25·3
N.-W. F. P.	608	434	414	455	627	610	542	562	468	406	496	422	6,044	18
Punjab	5,872	4,188	4,825	4,799	6,539	6,973	5,631	5,956	5,666	5,332	5,528	4,953	66,262	20
Delhi	1,017	859	965	1,134	1,583	1,344	1,126	1,065	1,048	938	920	739	12,738	27
U. P.	13,088	11,511	14,440	18,393	21,792	18,753	13,016	14,984	15,755	13,125	11,972	0,971	177,800	31
B. & O.	1,643	1,302	1,624	1,790	1,996	1,827	2,117	2,308	2,065	1,801	1,645	1,720	21,748	15
Bengal	7,034	6,303	6,658	6,396	6,494	5,162	5,791	5,877	5,486	5,585	6,082	6,639	73,507	21
C. P.	3,755	3,220	4,124	4,326	5,408	4,530	3,734	5,056	5,725	5,245	4,946	4,854	54,923	31
Bombay	10,454	9,197	11,462	10,828	10,244	8,166	8,763	9,926	8,992	8,701	8,796	9,077	114,606	26
Madras*	10,364	8,518	8,639	8,220	8,055	7,789	9,360	10,127	9,402	9,887	9,971	10,041	111,273	17
Coorg	45	23	38	41	35	49	43	56	43	33	36	46	488	51
Assam	337	297	235	289	351	392	410	308	329	326	363	268	3,905	19
Burma	3,547	3,052	3,483	3,499	3,492	3,221	3,716	3,569	3,417	3,700	3,983	3,948	42,627	30
Ajmer-Merwara	607	455	549	811	960	571	326	477	501	467	414	387	6,525	36

* For municipalities only.

TABLE I.—DEATHS ACCORDING TO AGE.

	Under one year.		1—5 years.		5—10 years.		10—15 years.		15—20 years.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
BRITISH INDIA	777,821	654,615	587,957	554,451	181,579	164,566	98,736	86,184	103,019	122,941
N.-W. F. P.	5,884	4,158	4,435	3,662	1,494	1,189	856	758	879	846
Punjab	90,192	75,725	56,022	49,718	17,244	15,125	12,364	11,396	12,127	11,857
Delhi	2,690	2,426	2,104	2,079	520	465	315	353	374	466
U. P.	149,626	124,663	163,108	143,042	32,261	28,253	18,943	17,097	17,107	17,917
B. & O.	91,962	76,726	103,616	97,545	34,420	28,826	18,271	14,340	17,200	17,247
Bengal	140,449	118,587	78,783	78,239	42,891	38,794	23,350	19,058	22,765	33,157
C. P.	Not available.									
Bombay	71,423	60,821	61,033	61,632	13,771	13,878	6,659	6,783	6,643	8,327
Madras*	161,475	136,921	87,414	87,005	26,304	26,344	10,858	10,114	17,941	24,297
Coorg	375	340	186	197	104	102	60	81	122	116
Assam	21,015	18,140	14,800	14,887	6,779	5,980	3,269	2,794	3,219	4,284
Burma	40,349	34,026	14,361	14,431	5,465	5,269	3,595	3,214	4,424	4,149
Ajmer-Merwara	2,381	2,082	2,095	2,014	326	341	196	196	218	278

	20—30 years.		30—40 years.		40—50 years.		50—60 years.		60 years & upwards.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
BRITISH INDIA	229,061	285,081	240,934	226,083	244,366	183,627	242,738	193,924	448,948	419,858
N.-W. F. P.	2,214	2,182	2,190	2,185	2,178	1,739	2,227	1,577	3,179	1,964
Punjab	18,433	19,671	18,946	18,719	20,083	17,833	22,250	18,383	43,004	34,747
Delhi	832	1,033	657	614	602	463	612	449	1,254	1,002
U. P.	40,976	47,128	40,848	39,853	44,934	33,887	47,624	36,725	82,969	72,692
B. & O.	42,823	47,429	44,018	39,685	39,798	31,840	40,413	37,415	59,457	64,020
Bengal	53,121	72,124	54,996	47,879	53,181	36,622	47,156	35,666	72,533	62,076
C. P.	Not available.									
Bombay	17,471	23,053	19,727	18,404	21,869	15,022	22,241	15,244	47,283	46,235
Madras*	35,589	50,557	39,321	40,131	42,951	32,765	43,005	35,596	107,246	109,028
Coorg	251	251	306	242	255	160	164	120	191	145
Assam	6,668	10,248	7,634	7,288	7,199	5,073	6,766	4,888	10,705	8,087
Burma	10,151	10,749	11,826	10,652	10,646	7,797	9,515	7,401	20,114	19,001
Ajmer-Merwara	532	656	465	431	670	426	765	460	1,013	861

* Madras includes 526 deaths amongst Europeans and Anglo-Indians.

TABLE J.—DEATH RATES ACCORDING TO AGE.

	Under 1 year.		1—5 years.		5—10 years.		10—15 years.		15—20 years.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
BRITISH INDIA . .	166	152	38	36	10	10	6	6	8	10
N.-W. F. P. . .	137	126	27	23	8	8	5	6	8	8
Punjab . . .	160	150	36	33	10	10	7	8	10	11
Delhi . . .	181	174	58	59	13	13	8	11	9	15
U. P. . . .	162	152	53	46	9	10	6	7	7	8
B. & O. . . .	137	121	44	39	12	11	8	7	11	10
Bengal . . .	166	151	26	25	12	12	7	7	10	13
C. P. . . .					Not available.					
Bombay . . .	170	157	45	45	9	10	5	6	6	8
Madras . . .	189	168	32	31	8	9	4	4	9	11
Coorg . . .	168	174	24	25	11	11	6	9	13	15
Assam . . .	170	156	66	90	16	21	5	6	4	6
Burma . . .	198	174	21	20	7	7	5	5	7	7
Ajmer-Merwara . .	207	209	62	59	9	10	6	7	7	10

	20—30 years.		30—40 years.		40—50 years.		50—60 years.		60 years & upwards.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
BRITISH INDIA . .	10	12	12	13	18	16	30	26	83	79
N.-W. F. P. . .	10	10	12	14	19	19	32	29	57	51
Punjab . . .	8	10	11	13	16	18	28	30	60	65
Delhi . . .	10	18	10	16	16	21	33	36	103	115
U. P. . . .	9	11	11	12	17	14	31	26	82	71
B. & O. . . .	13	13	16	14	20	17	36	33	83	72
Bengal . . .	11	15	14	15	21	19	35	31	82	76
C. P. . . .					Not available.					
Bombay . . .	8	11	11	12	19	15	34	26	112	111
Madras . . .	9	11	12	12	18	15	30	25	98	96
Coorg . . .	13	16	19	23	27	27	37	34	76	59
Assam . . .	19	26	15	16	12	9	12	8	78	58
Burma . . .	9	9	13	13	17	14	24	19	61	59
Ajmer-Merwara . .	9	13	11	12	21	16	42	30	109	83

TABLE K.—DEATHS ACCORDING TO AGE IN RURAL AREAS.

	Under one year.		1—5 years.		5—10 years.		10—15 years.		15—20 years.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
BRITISH INDIA	678,276	570,360	524,738	492,069	166,587	149,726	89,997	76,341	92,374	107,425
N.-W. F. P.	5,082	3,509	3,802	3,115	1,325	1,055	771	631	766	699
Punjab	79,459	66,661	49,116	43,291	15,563	13,558	11,206	10,091	10,862	10,200
Delhi	833	713	695	643	215	158	112	117	119	123
U. P.	121,920	100,977	142,055	121,678	28,383	24,200	16,817	14,146	14,953	13,739
B. & O.	89,592	74,809	101,761	95,916	33,803	28,264	17,853	13,936	16,752	16,641
Bengal	132,949	112,299	75,084	74,981	40,831	37,092	21,968	17,898	21,142	31,456
C. P.					Figures not available.					
Bombay	54,236	45,972	49,447	49,975	11,764	11,747	5,559	5,522	5,212	6,231
Madras*	136,945	116,464	73,876	73,570	22,745	22,717	9,090	8,219	15,381	20,283
Coorg	363	327	171	182	96	95	52	71	100	105
Assam	20,560	17,789	14,579	14,662	6,681	5,861	3,212	2,734	3,130	4,171
Burma	35,135	29,787	12,879	12,914	4,973	4,768	3,216	2,851	3,805	3,625
Ajmer-Merwara	1,202	1,053	1,273	1,142	208	211	141	125	152	152

	20—30 years.		30—40 years.		40—50 years.		50—60 years.		60 years & upwards.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
BRITISH INDIA	199,558	248,246	213,864	201,891	217,226	165,643	216,708	176,566	395,604	369,753
N.-W. F. P.	1,925	1,886	1,953	1,968	1,912	1,588	1,972	1,459	2,682	1,652
Punjab	16,266	16,914	17,035	16,869	18,199	16,247	20,113	16,770	38,286	30,931
Delhi	274	320	246	268	232	199	242	206	482	375
U. P.	35,813	37,943	36,294	34,490	40,175	30,138	42,604	33,160	70,791	61,577
B. & O.	41,740	46,170	42,949	38,873	38,758	31,242	39,398	36,777	57,714	62,355
Bengal	46,462	66,478	50,739	44,530	49,109	33,864	43,496	33,083	67,189	57,270
C. P.					Figures not available.					
Bombay	13,017	17,303	15,135	14,803	17,115	12,394	17,798	12,703	38,764	38,216
Madras*	29,062	41,374	32,392	33,276	35,629	27,758	36,046	30,670	90,949	92,102
Coorg	193	202	211	214	197	149	145	111	167	129
Assam	6,387	10,020	7,319	7,133	6,935	4,972	6,546	4,773	10,459	7,895
Burma	8,061	9,281	9,255	9,247	8,486	6,803	7,806	6,512	17,430	16,701
Ajmer-Merwara	358	355	336	280	479	289	542	342	691	550

* Including Europeans and Anglo-Indians.

TABLE L.—DEATHS ACCORDING TO AGE IN URBAN AREAS.

	Under one year.		1—5 years.		5—10 years.		10—15 years.		15—20 years.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
BRITISH INDIA . .	99,545	84,255	63,219	62,382	14,992	14,840	8,739	9,843	10,645	15,516
N.-W. F. P. . .	802	649	633	547	169	134	85	127	113	147
Punjab . . .	10,733	9,064	6,906	6,427	1,681	1,567	1,158	1,305	1,265	1,657
Delhi . . .	1,857	1,713	1,409	1,486	305	307	203	236	255	343
U. P. . . .	27,706	23,686	21,053	21,364	3,878	4,053	2,126	2,951	2,154	4,178
B. & O. . . .	2,370	1,917	1,855	1,629	617	562	418	404	448	606
Bengal . . .	7,500	6,288	3,699	3,258	2,060	1,702	1,382	1,160	1,623	1,701
C. P. . . .	Figures not available.									
Bombay . . .	17,187	14,849	11,586	11,657	2,007	2,131	1,100	1,261	1,431	2,096
Madras . . .	24,530	20,457	13,538	13,435	3,559	3,627	1,768	1,895	2,560	4,014
Coorg . . .	12	13	15	15	8	7	8	10	22	11
Assam . . .	455	351	221	225	98	119	57	60	89	113
Burma . . .	5,214	4,239	1,482	1,517	492	501	379	363	619	524
Ajmer-Merwara . .	1,179	1,029	822	872	118	130	55	71	66	126

	20—30 years.		30—40 years.		40—50 years.		50—60 years.		60 years & upwards.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
BRITISH INDIA . .	29,503	36,835	27,070	24,192	27,140	17,984	26,030	17,358	53,344	50,105
N.-W. F. P. . .	289	296	237	217	266	151	255	118	497	312
Punjab . . .	2,167	2,757	1,911	1,910	1,884	1,586	2,137	1,613	4,718	3,816
Delhi . . .	558	713	411	346	370	264	370	243	772	627
U. P. . . .	5,163	6,185	4,554	5,363	4,759	3,749	5,020	3,565	12,178	11,115
B. & O. . . .	1,083	1,259	1,069	812	1,040	598	1,015	638	1,743	1,665
Bengal . . .	6,659	5,646	4,257	3,349	4,072	2,758	3,660	2,583	5,344	4,806
C. P. . . .	Figures not available.									
Bombay . . .	4,454	5,750	4,592	3,601	4,754	2,628	4,443	2,541	8,519	8,019
Madras* . . .	6,527	9,183	6,929	6,855	7,322	5,007	6,959	4,926	16,297	16,926
Coorg . .	58	49	95	28	58	11	19	9	24	16
Assam . . .	281	228	315	155	264	101	220	115	246	192
Burma . . .	2,090	1,468	2,571	1,405	2,160	994	1,709	859	2,684	2,300
Ajmer-Merwara . .	174	301	129	151	191	137	223	118	322	311

* Including Europeans and Anglo-Indians.

TABLE M.—INFANTILE MORTALITY RATE IN TOWNS HAVING A POPULATION OF 30,000 AND OVER.

Towns.	Rates p. m. live-births.
N.-W. F. Province.	
Peshawar	194
Dera Ismail Khan	115
Delhi.	
Delhi	196
New Delhi	69
United Provinces.	
Dehra	254
Saharanpur	281
Hardwar Union	308
Muzaffarnagar	183
Meerut	166
Khurja	227
Aligarh	223
Hathras	293
Muttra	222
Agra	199
Bareilly	155
Budaun	306
Moradabad	216
Amroha	194
Sambhal	229
Shahjahanpur	225
Pilibhit	253
Farrukhabad-*cum*-Fatehgarh	270
Etawah	311
Cawnpore	287
Allahabad	194
Jhansi	241
Benares	280
Mirza-Bindhachal	183
Jaunpur	138
Gorakhpur	190
Lucknow	224
Fyzabad-Ajodhya	180
Bahraich	184
Bengal Presidency.	
Asansol	156
Bankura	104
Hooghly-Chinsura	144
Serampur	156
Howrah	261
South Suburban	133
Baranagar	195

Towns.	Rates p. m. live-births.
Bengal—contd.	
Titagarh	195
Naihati	127
Bhatpara	155
Calcutta	239
Serajganj	147
Dacca	172
Narayanganj	191
Mymensingh	218
Barisal	256
Chittagong	186
Central Provinces.	
Nagpur	261
Jubbulpore	223
Saugor	226
Khandwa	225
Burhanpur	228
Raipur	275
Bilaspur	236
Amraoti	160
Akola	215
Bombay Presidency.	
Bombay	248
Jalgaon	179
Dhulia	171
Surat	272
Broach	152
Nadiad	386
Godhra	240
Ahmedabad	280
Ahmednagar	149
Poona	320
Nasik	274
Malegaon	244
Bandra	150
Kurla	210
Belgaum	157
Gadag-Bettigeri	193
Bijapur	106
Sholapur	222
Karachi	151
Hyderabad	232
Sukkur	123
Shikarpur	221

TABLE M.—INFANTILE MORTALITY RATE IN TOWNS HAVING A POPULATION OF 30,000 AND OVER—*concld.*

Towns.	Rates p. m. live-births.
Madras Presidency.	
Bellary	207
Adoni	120
Conjeevaram	167
Saidapet	169
Coimbatore	168
Erode	129
Berhampur	123
Cocanada	239
Rajahmundry	298
Guntur	158
Tenali	151
Bezwada	261
Masulipatam	237
Madras	227
Madura	239
Dindigul	139
Calicut	158
Palghat	175
Cannanore	107
Tellicherry	167
Nellore	200
Vellore	188
Virudhunagar	184
Srivilliputtur	161
Salem	149
Cuddalore	170
Tanjore	184
Kumbakonam	172
Negapatam	208
Mayavaram	134
Tuticorin	229
Tinnevelly	258
Palamcottah	206
Trichinopoly	157
Vizagapatam	323
Vizianagram	188
Burma.	
Akyab	198
Rangoon	252
Bassien	260
Moulmein	187
Mandalay	228

TABLE N.—INFANTILE MORTALITY IN RURAL AND URBAN AREAS.

	Rural.		Urban.	
	Deaths.	Rate p. m. live-births.	Deaths.	Rate p. m. live-births.
Total	1,386,801	158	201,401	213
N.-W. F. P.	8,591	131	1,451	137
Punjab	146,120	154	19,797	163
Delhi	1,546	169	3,570	181
U. P.	222,897	148	51,392	211
B. & O.	164,401	129	4,287	137
Bengal	245,248	158	13,788	178
C. P.	138,165	224	17,601	218
Bombay	100,208	152	32,036	214
Madras	253,409	167	44,987	300
Coorg	690	184	25	59
Assam	38,349	164	806	126
Burma	64,922	177	9,453	256
Ajmer-Merwara	2,255	160	2,208	299

Appendix II

relating to

Section II–Chief diseases.

TABLE A.—DEATHS AND RATES P. M. FROM CHIEF GROUPS OF DISEASES.

	Cholera.		Small-pox.		Plague.		Fevers.		Dysentery and Diarrhœa.		Respiratory Diseases.		Other causes.		Total.	
	Deaths.	Rate p. m.	Deaths.	Rate p. m.	Deaths.	Rate p. m.	Deaths.	Rate p. m.	Deaths.	Rate p. m.	Deaths.	Rate p. m.	Deaths.	Rate p. m.	Deaths.	Rate p. m.
BRITISH INDIA	217,162	0·8	90,703	0·3	32,091	0·1	3,754,751	13·5	279,223	1·0	482,870	1·7	1,721,911	6·2	6,578,711	23·6
N.-W. F. P. .	245	0·0	86	0·0	...	...	36,939	15·0	399	0·2	2,822	1·1	5,305	2·2	45,796	18·5
Punjab . .	714	0·0	1,822	0·1	976	0·0	396,321	15·8	12,292	0·5	58,800	2·3	112,914	4·5	583,839	23·2
Delhi . .	181	0·2	427	0·6	...	...	11,066	17·8	648	1·0	3,420	5·1	2,668	4·0	19,310	28·7
U. P. .	10,412	0·2	26,032	0·5	23,019	0·5	929,298	18·3	18,283	0·4	46,270	0·9	146,339	2·9	1,199,653	23·6
B. & O. . .	64,876	1·6	22,967	0·6	2,861	0·1	663,964	16·9	19,956	0·5	7,148	0·2	165,279	4·2	947,051	24·1
Bengal . .	59,605	1·2	7,548	0·1	2	...	705,628	13·7	51,930	1·0	84,868	1·7	221,846	4·3	1,131,427	22·0
C. P. . . .	20,140	1·2	2,802	0·2	798	0·0	281,367	17·2	35,299	2·2	39,462	2·4	152,880	9·3	532,748	32·5
Bombay . .	11,235	0·5	13,976	0·6	2,453	0·1	204,752	8·9	26,130	1·1	115,262	5·0	183,711	8·0	557,519	24·3
Madras . .	35,456	0·7	12,330	0·3	645	0·0	315,998	6·6	96,181	2·0	102,843	2·1	560,883	11·8	1,124,336	23·5
Coorg. . . .	...	...	42	0·3	25	0·2	2,804	17·0	168	1·0	156	1·0	573	3·5	3,768	23·0
Assam . .	7,436	0·9	529	0·1	...	...	106,719	12·9	10,947	1·3	7,022	0·8	37,070	4·5	169,723	20·5
Burma . .	6,858	0·5	1,262	0·1	1,312	0·1	88,426	7·0	6,366	0·5	11,954	1·0	130,957	10·3	247,135	19·5
Ajmer-Merwara .	4	...	880	1·5	...	...	10,569	18·3	624	1·1	2,843	4·9	1,486	2·6	16,406	28·4

TABLE B.—DEATHS FROM CHOLERA FROM 1905 TO 1935.

Year.	British India.	N.-W. F. P.	Punjab.	Delhi.	U. P.	B. & O.	Bengal.	C. P.	Bombay.	Madras.	Coorg.	Assam.	Burma.	Ajmer-Merwara.	Indian States. Rajputana.	Central India.	Hyderabad.	Mysore.
1905—1909	2,371,365	3,545	20,354	324	399,144	555,350	677,816	61,011	89,644	422,658	410	95,927	44,897	285	5,926	13,366	2,227	16,000
1910—1914	1,767,770	5,421	17,643	503	331,970	394,482	451,025	78,258	96,929	289,444	254	81,967	19,800	74	6,219	25,896	9,210	17,672
1915—1919	2,098,749	5,557	25,030	242	346,359	598,862	453,864	110,998	97,606	321,297	191	99,088	38,713	942	7,970	15,652	26,647	13,062
1920—1924	1,069,136	4,390	22,843	781	228,540	229,512	276,455	72,680	25,793	131,845	34	54,379	21,805	79	3,911	6,826	9,254	8,023
1925	115,645	116	3,049	50	7,653	17,336	34,276	124	57	44,815	4	6,233	1,932	...	...	43	22	...
1926	138,151	...	87	18	6,166	27,268	59,106	4,565	73	24,407	2	10,275	6,182	2	4	269	26	6
1927	304,710	2	11,286	16	28,285	49,022	118,377	16,311	26,153	35,334	...	15,392	4,528	4	1,357	2,584	8,913	1,367
1928	351,305	...	2,034	34	44,941	77,103	136,245	12,198	6,881	57,677	...	6,915	7,209	68	1,371	7,520	4,314	413
1929	295,434	30	2,309	193	50,924	104,034	181,090	6,168	9,084	25,846	1	7,765	7,970	20	722	1,155	450	140
1930	337,322	449	1,181	8	61,334	155,215	54,963	23,250	15,142	18,746	...	6,332	661	41	2,101	11,165	18,369	535
1931	220,909	105	391	61	31,118	40,943	79,073	14,135	18,646	30,232	116	5,523	534	32	294	1,411	5,653	6,385
1932	67,219	70	614	4	9,734	9,348	33,910	854	1,353	5,278	...	4,971	1,082	1	122	168	71	83
1933	68,318	...	160	...	1,915	17,514	29,242	2,152	7,797	3,851	...	5,508	179	...	35	642	4,838	90
1934	199,708	...	178	19	31,903	57,289	50,742	27,329	11,362	18,158	1	1,904	822	1	969	4,471	4,951	346
1935	217,162	245	714	181	10,412	64,876	59,605	20,140	11,235	35,456	...	7,486	6,858	4	33	1,043	10,553	1,407

Table C.—Deaths and rates p. m. from Cholera in rural and urban areas.

	Deaths.			Rate p. m.			No. of anti-cholera inoculations.	Total villages.	Number infected.
	R.	U.	Total.	R.	U.	Total.			
British India	201,395	15,767	217,162	0·8	0·5	0·8	6,929,809	461,144	42,233
N.-W. F. P.	201	44	245	0·1	0·1	0·1	46,084	2,802	79
Punjab	360	354	714	...	0·1	...	60,150	34,520	158
Delhi	17	164	181	0·1	0·4	0·2	23,124	17	6
U. P.	9,338	1,074	10,412	0·2	0·2	0·2	207,620	105,640	1,799
B. & O.	63,750	1,126	64,876	1·7	0·8	1·6	945,665	83,402	12,149
Bengal	54,835	4,770	59,605	1·1	1·4	1·2	2,329,326	86,361	14,569
C. P.	18,903	1,237	20,140	1·2	0·7	1·2	590,587	39,874	2,785
Bombay	*10,556*	679	11,235	0·6	0·2	0·5	201,749	30,550	1,906
Madras	*30,370*	5,086	35,456	0·7	0·8	0·7	1,889,904	37,093	5,605
Coorg	...	...	...	...	...	...	...	298	...
Assam	7,334	102	7,436	0·9	0·5	0·9	333,534	28,333	1,509
Burma	5,730	1,128	6,858	0·5	0·8	0·5	241,713	11,515	1,066
Ajmer-Merwara	1	3	4	...	...	...	353	739	2

Table D.—Deaths from Cholera by months.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
British India	13,717	10,848	13,686	23,899	17,324	15,637	19,809	29,435	30,068	17,527	12,871	12,341	217,162
N.-W. F. P.	...	...	...	...	...	...	...	33	181	31	...	...	245
Punjab	...	2	2	4	10	17	159	210	203	90	12	5	714
Delhi	...	...	...	...	1	3	143	25	8	...	1	...	181
U. P.	145	146	644	1,907	1,891	1,827	1,097	1,379	1,449	370	49	8	10,412
B. & O.	388	315	1,461	4,702	5,812	5,860	8,125	15,341	10,801	7,326	3,515	1,230	64,876
Bengal	5,785	5,328	8,270	9,500	5,152	2,412	3,143	3,979	3,242	2,485	4,266	6,043	59,605
C. P.	52	224	296	3,880	1,330	2,512	2,903	732	5,451	2,400	327	33	20,140
Bombay	16	54	60	117	104	118	1,107	2,814	3,901	1,388	1,172	384	11,235
Madras	6,205	3,956	2,081	1,542	953	1,249	1,773	3,539	4,402	3,020	2,921	3,815	35,456
Coorg	...	...	...	...	...	...	...	...	...	...	...	...	...
Assam	609	240	297	1,249	2,167	1,080	462	248	135	134	343	472	7,436
Burma	517	583	575	998	404	558	895	1,134	295	283	265	351	6,858
Ajmer-Merwara	...	...	...	...	...	1	2	1	...	...	...	...	4

TABLE E.—DEATHS FROM PLAGUE BY MONTHS.

(i) British Provinces.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.	Rate p.m.	No. of anti-plague inoculations.
GRAND TOTAL .	4,900	6,425	7,959	7,870	4,467	953	380	555	979	1,494	1,131	1,389	38,502	...	..
BRITISH INDIA .	3,511	5,342	7,284	7,612	4,357	853	214	259	419	607	648	985	32,091	0·1	709,143
N.-W. F. P. . .	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Punjab . . .	22	145	159	319	356	69	2	1	...	...	3	...	976	..	80,715
Delhi . . .	...	...	...	...	...	...	...	...	...	...	...	...	...	...	9
U. P. . . .	2,129	3,421	5,354	6,426	3,842	738	100	54	87	134	264	470	23,019	0·5	207,991
B. & O. . . .	319	789	879	600	93	3	7	6	14	11	25	115	2,861	0·1	64,524
Bengal . . .	...	...	2	...	...	...	...	...	...	...	...	...	2	...	...
C. P. . . .	87	147	125	24	4	...	4	24	64	131	121	67	798	...	20,888
Bombay . . .	523	557	489	163	30	9	46	86	148	216	94	92	2,453	0·1	113,418
Madras . . .	137	81	58	18	2	2	4	36	52	84	84	92	645	...	82,243
Coorg . . .	1	1	1	...	...	...	4	1	7	6	2	2	25	0·2	14,275
Assam . . .	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Burma . . .	293	301	217	67	30	32	47	51	47	25	55	147	1,312	0·1	125,079
Ajmer-Merwara .	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

(ii) Indian States and Agencies.

TOTAL . .	1,389	1,083	675	258	110	100	166	296	560	887	483	404	6,411
Punjab . . .	...	23	22	36	12	...	...	...	...	...	16	...	109
U. P. . . .	...	...	...	9	3	...	...	...	...	...	...	...	12
B. & O. . . .	...	...	...	...	...	...	...	...	...	...	...	...	...
Bengal . . .	...	...	...	...	...	...	...	...	...	...	...	...	...
C. P. . . .	...	...	...	...	...	...	...	...	...	...	...	...	...
Deccan States Agency & Kolhapur Residency . . .	148	124	82	11	11	...	30	42	49	36	14	...	547
Madras . . .	12	11	4	3	...	...	...	...	...	...	...	...	30
Mysore . . .	440	307	168	81	59	73	110	73	177	129	121	84	1,822
Bangalore C. & M. Station . .	4	1	2	2	...	...	...	2	...	...	1	...	12
Hyderabad . .	703	483	338	87	14	21	14	154	312	704	284	307	3,421
C. I. Agency . .	10	33	9	16	3	...	...	...	19	12	42	10	154
Baroda . . .	31	52	32	5	...	...	...	...	...	...	2	...	122
Cambay State .	...	1	4	1	...	...	...	...	...	...	...	...	6
Rajputana . .	28	48	14	5	...	...	...	...	...	...	...	...	95
Assam . . .	...	...	...	...	...	...	...	...	...	...	...	...	...
Burma . . .	13	...	...	...	4	6	12	25	1	6	3	3	73
Jammu & Kashmir	...	...	...	2	4	...	...	...	2	...	...	...	8
Baluchistan	...	...	...	...	...	...	...	...	...	...	...	...	...

TABLE F.—DEATHS AND RATES P. M. FROM SMALLPOX IN RURAL AND URBAN AREAS.

	Deaths.			Death rate p. m.			Deaths in children.			Percentage of deaths to total mortality.		
	R.	U.	Total.	R.	U.	Total.	Under 1 year.	1—10 years.	Total.	Under 1 year.	1—10 years.	Total.
BRITISH INDIA	**72,446**	**18,257**	**90,703**	**0·3**	**0·6**	**0·3**	**17,653**	**26,506**	**44,159**	**20**	**29**	**49**
N.-W. F. P.	80	6	86	...	...	...	18	46	64	21	54	75
Punjab	1,298	524	1,822	0·1	0·1	0·1	531	887	1,418	29	49	78
Delhi	6	421	427	...	0·9	0·6	139	204	343	32	48	80
U. P.	20,012	6,020	26,032	0·4	1·1	0·5	6,432	9,282	15,714	25	35	60
B. & O	22,459	508	22,967	0·6	0·4	0·6	1,602	3,096	4,698	7	13	20
Bengal	5,279	2,269	7,548	0·1	0·6	0·1	400	910	1,310	5	12	17
C. P.	2,165	637	2,802	0·1	0·4	0·2	958	1,177	2,135	34	42	76
Bombay	9,538	4,438	13,976	0·5	1·0	0·6	4,114	6,839	10,953	29	49	78
Madras	9,823	2,507	12,330	0·2	0·4	0·3	3,338	3,751	7,089	27	30	57
Coorg	28	14	42	0·1	1·5	0·3	9	9	18	21	21	42
Assam	516	13	529	0·1	0·1	0·1	14	26	40	3	5	8
Burma	724	538	1,262	0·1	0·4	0·1	98	279	377	8	22	30
Ajmer-Merwara	518	362	880	1·3	2·0	1·5	...	...	...	...	...	...

TABLE G.—DEATHS FROM SMALLPOX BY MONTHS.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
BRITISH INDIA	**7,053**	**7,485**	**10,300**	**15,047**	**15,423**	**11,181**	**7,107**	**4,848**	**2,475**	**1,770**	**2,613**	**5,401**	**90,703**
N.-W. F. P.	18	3	14	11	13	11	8	1	...	...	5	2	86
Punjab	118	125	113	155	307	272	162	81	55	53	128	253	1,822
Delhi	10	26	43	85	125	79	24	8	...	1	14	12	427
U. P.	1,617	1,876	2,572	4,891	5,264	4,106	2,198	1,242	516	260	492	998	26,032
B. & C.	1,510	1,493	1,993	3,711	4,174	3,421	2,318	1,128	618	369	695	1,537	22,967
Bengal	327	379	770	1,211	1,206	843	492	309	250	187	393	1,181	7,548
C. P.	131	234	370	111	545	275	181	560	47	28	94	226	2,802
Bombay	1,610	1,898	2,709	2,863	2,021	1,060	719	376	159	94	165	302	13,976
Madras	1,559	1,274	1,372	1,321	1,137	849	875	1,044	766	735	594	804	12,330
Coorg	7	6	8	3	2	5	2	5	...	...	4	...	42
Assam	14	26	28	99	112	87	36	24	20	27	16	40	529
Burma	71	94	203	336	275	95	54	45	36	14	13	26	1,262
Ajmer-Merwara	61	51	105	250	242	78	38	26	8	2	...	20	880

TABLE H.—DEATHS AND RATES P. M. FROM FEVERS AND MALARIA IN RURAL AND URBAN AREAS.

	Fever deaths.			Death rate p. m.			Reported malaria deaths.		
	R.	U.	Total.	R.	U.	Total.	R.	U.	Total.
British India	3,542,096	212,655	3,754,751	14·2	7·3	13·5	1,560,646	71,437	1,632,083
N.-W. F. P.	33,940	2,999	36,939	15·9	9·1	15·0	...	100	100
Punjab	366,692	29,629	396,321	16·8	8·9	15·8	159,529	10,776	170,305
Delhi	5,001	6,965	11,966	24·2	15·0	17·8	11	46	57
U. P.	858,648	70,650	929,298	19·0	12·4	18·3	780,557	33,034	813,591
B. & O.	653,787	10,177	663,964	17·3	7·0	16·9	...	1,380	1,380
Bengal	691,624	14,004	705,628	14·5	4·0	13·7	340,637	2,318	342,955
C. P.	261,619	19,748	281,367	17·9	11·2	17·2	251,386	17,863	269,249
Bombay	181,481	23,271	204,752	9·8	5·4	8·9	28,526	2,695	31,221
Madras	287,802	28,196	315,998	7·0	4·4	6·6	...	1,324	1,324
Coorg	2,759	45	2,804	17·8	4·7	17 0	...	...	...
Assam	105,607	1,112	106,719	13·8	5·4	12·9	...	248	248
Burma	83,943	4,483	88,426	7·5	3·1	7·0	...	1,569	1,569
Ajmer-Merwara	9,193	1,376	10,569	23·1	7·6	18·3	...	84	84

TABLE I.—DEATHS FROM FEVERS BY MONTHS.

	Jan.	Feb.	Mar.	Apl.	May.	June.	July.	Aug.	Sept.	Oct.	Nov	Dec.	Total.
British India	307,804	252,672	265,567	307,743	340,509	333,669	299,956	309,120	331,443	342,309	339,259	333,700	3,754,751
N.-W. F. P.	4,310	3,987	2,776	2,484	2,895	3,371	2,773	2,784	2,362	2,672	3,239	3,286	36,939
Punjab	42,076	30,448	27,199	27,216	34,925	36,225	30,804	28,204	35,396	36,607	34,428	32,793	396,321
Delhi	879	664	824	1,086	1,511	1,402	906	896	1,071	1,024	989	714	11,966
U. P.	71,909	66,403	65,019	86,803	96,758	101,557	80,606	71,183	77,285	76,822	70,786	64,167	929,298
B. & O.	49,912	38,753	41,577	54,067	59,474	62,774	57,381	58,710	64,756	62,423	58,005	56,132	663,964
Bengal	62,667	49,970	54,453	57,410	53,908	44,429	47,660	50,880	57,887	67,153	77,133	82,078	705,628
C. P.	16,815	14,500	18,386	22,265	28,261	26,939	16,744	20,783	28,712	31,559	29,345	27,058	281,367
Bombay	17,121	14,692	19,077	19,527	19,440	14,241	14,733	17,142	16,764	16,441	18,499	17,075	204,752
Madras	25,343	20,278	22,714	20,992	26,140	23,907	27,197	30,620	30,463	28,656	28,683	31,005	315,998
Coorg	161	145	195	193	219	328	356	286	258	265	178	220	2,804
Assam	8,018	6,365	5,883	7,900	9,799	11,823	11,466	9,554	8,466	9,546	8,965	8,934	106,719
Burma	7,297	5,448	6,502	6,958	6,267	6,007	8,779	8,271	6,963	8,198	8,263	9,473	88,426
Ajmer-Merwara	1,296	1,019	962	842	912	666	551	807	1,060	943	746	765	10,569

TABLE J.—DEATHS AND RATES P. M. FROM DYSENTERY AND DIARRHŒA IN RURAL AND URBAN AREAS AND BY SEX.

	Deaths.					Rate per *mille*.		
	R.	U.	M.	F.	Total.	R.	U.	Total.
British India	**223,629**	**55,594**	**145,389**	**133,834**	**279,223**	**0·9**	**1·9**	**1·0**
N. W. F. P.	173	226	243	156	399	0·1	0·7	0·2
Punjab	8,504	3,788	6,589	5,703	12,292	0·4	1·1	0·5
Delhi	117	531	357	291	648	0·5	1·1	1·0
U. P.	5,456	12,827	9,346	8,937	18,283	0·1	2·3	0·4
B. & O.	18,805	1,151	10,640	9,316	19,956	0·4	0·8	0·5
Bengal	44,903	7,027	27,375	24,555	51,930	0·9	2·0	1·0
C. P.	31,220	4,079	17,965	17,334	35,299	2·1	2·3	2·2
Bombay	20,253	5,877	13,705	12,425	26,130	1·1	1·4	1·1
Madras	79,168	17,013	49,394	46,787	96,181	1·9	2·6	2·0
Coorg	129	39	92	76	168	0·8	4·1	1·0
Assam	10,469	478	5,791	5,156	10,947	1·3	2·3	1·3
Burma	4,430	1,936	3,596	2,770	6,366	0·4	1·4	0·5
Ajmer-Merwara	2	622	296	328	624	...	3·5	1·1

TABLE K.—DEATHS FROM DYSENTERY AND DIARRHŒA BY MONTHS.

	Jan.	Feb.	Mar.	Apl.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
British India	**21,182**	**16,332**	**17,721**	**21,887**	**22,271**	**21,599**	**25,536**	**29,387**	**31,920**	**26,571**	**22,620**	**22,197**	**279,223**
N.-W. F. P.	40	24	26	33	32	38	23	45	55	17	31	35	399
Punjab	844	629	811	864	1,301	1,292	964	1,126	1,268	1,200	1,006	987	12,292
Delhi	46	15	25	28	35	41	74	128	119	63	45	29	648
U. P.	854	888	1,159	1,516	2,184	2,184	1,784	2,115	2,036	1,501	1,155	907	18,283
B. & O.	1,484	1,165	1,332	1,653	1,398	1,349	1,882	2,719	2,563	1,721	1,301	1,389	19,956
Bengal	4,543	3,671	4,093	5,131	4,424	3,507	3,968	4,348	4,433	4,467	4,407	4,933	51,930
C. P.	1,591	1,462	1,729	4,314	2,206	2,327	2,170	1,740	6,797	5,218	3,255	2,490	35,299
Bombay	1,449	1,163	1,432	1,282	1,636	1,563	2,988	4,255	3,550	2,575	2,261	1,856	26,130
Madras	9,289	6,521	6,193	5,512	7,014	7,193	9,498	10,974	9,515	8,321	7,864	8,287	96,181
Coorg	9	5	5	6	26	21	25	13	23	15	16	4	168
Assam	661	490	568	990	1,417	1,407	1,124	966	849	944	817	714	10,947
Burma	355	262	311	383	510	640	1,006	848	634	473	409	535	6,366
Ajmer-Merwara	17	17	32	75	88	37	30	110	78	56	53	31	624

TABLE L.—DEATHS AND RATES P. M. FROM RESPIRATORY DISEASES IN RURAL AND URBAN AREAS AND BY SEX.

	Deaths.					Rate p. m.					Reported deaths from pulmonary tuberculosis.	
	R.	U.	Total.	M.	F.	R.	U.	Total.	M.	F.	R.[c]	U.
British India	327,308	155,562	482,870	273,029	209,841	1·3	5·3	1·7	1·9	1·6	...	...
N.-W. F. P.	1,580	1,242	2,822	1,631	1,191	0·7	3·8	1·1	1·2	1·0	...	315*
Punjab	44,763	14,037	58,800	33,060	25,740	2·1	4·2	2·3	2·4	2·3	8,269	1,901
Delhi	1,109	2,311	3,420	1,884	1,536	5·4	5·0	5·1	4·8	5·6	88	470
U. P.	8,083	38,187	46,270	24,038	22,232	0·2	6·7	0·9	1·0	0·9	373	6,052
B. & O.	6,279	869	7,148	4,203	2,945	0·2	0·6	0·2	0·2	0·1	....	4
Bengal	67,822	17,046	84,868	54,021	30,847	1·4	4·8	1·7	2·0	1·3	12,373	4,151
C. P.	34,106	5,356	39,462	23,070	16,392	2·3	3·0	2·4	2·8	2·0	3,258	890
Bombay	78,939	36,323	115,262	62,796	52,466	4·3	8·4	5·0	5·2	4·8	17,208	7,570
Madras	75,037	27,806	102,843	55,580	47,263	1·8	4·3	2·1	2·4	2·0	...	...
Coorg	66	90	156	118	38	0·4	9·4	1·0	1·3	0·5	...	...
Assam	6,456	566	7,022	4,096	2,926	0·8	2·8	0·8	0·9	0·7	...	158†
Burma	3,065	8,889	11,954	7,103	4,851	0·3	6·2	1·0	1·1	0·8	...	2,371
Ajmer-Merwara	3	2,840	2,843	1,429	1,414	...	15·8	4·9	4·7	5·2	74	...

TABLE M.—DEATHS FROM RESPIRATORY DISEASES BY MONTHS.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
British India	48,139	40,583	43,604	40,328	40,807	34,537	34,327	36,130	37,081	39,195	42,492	45,647	482,870
N.-W. F. P.	500	339	240	261	261	169	159	109	147	171	236	230	2,822
Punjab	9,341	6,394	4,503	4,273	4,877	4,796	4,066	3,243	3,526	3,982	4,332	5,467	58,800
Delhi	461	337	288	237	281	261	205	194	232	282	307	335	3,420
U. P.	4,192	3,877	4,470	4,864	5,194	3,919	3,006	3,177	3,073	3,265	3,625	3,608	46,270
B. & O.	683	584	697	733	661	547	546	555	514	497	512	619	7,148
Bengal	7,854	7,331	8,040	7,434	6,686	5,374	5,436	5,590	5,839	6,993	8,547	9,744	84,868
C. P.	3,115	2,800	3,680	3,083	3,281	2,751	2,435	3,541	3,759	3,709	3,645	3,663	39,462
Bombay	10,935	9,573	12,016	10,358	9,154	7,258	7,959	8,814	9,187	9,199	10,187	10,622	115,262
Madras	9,341	7,962	7,966	7,123	8,338	7,646	8,702	9,094	8,973	9,165	9,138	9,395	102,843
Coorg	14	9	10	20	11	11	11	12	17	12	8	21	156
Assam	582	474	489	600	646	597	591	555	538	672	703	575	7,022
Burma	957	831	967	939	886	884	1,043	1,061	1,068	1,058	1,083	1,177	11,954
Ajmer-Merwara	164	72	238	403	531	324	168	185	208	190	160	191	2,843

*For Municipal towns only.

†For 13 larger towns.

TABLE N.—QUININE AND CINCHONA FEBRIFUGE ISSUED BY THE PUBLIC HEALTH, MEDICAL, AND OTHER DEPARTMENTS IN THE VARIOUS PROVINCES OF BRITISH INDIA DURING 1935.

	Quinine.		Cinchona febrifuge.	
	Total issues in lbs.	Grains per head of population.	Total issues in lbs.	Grains per head of population.
British India	**36,260**	**1**	**25,745**	**1**
N. W. F. P.	1,617	3	737	1
Punjab	3,028*	1	416	..
Delhi	361	4	179	2
U. P.	3,693	1	4,174	1
B. & O.	317	..	..	..
Bengal	13,409	2	13,606	2
C. P.	1,515	2	676	1
Bombay	4,795	1	7	..
Madras	5,342	1	743	..
Coorg	488	21	279	12
Assam	1,608	1	2,453	2
Burma†	..	..	2,444	1
Ajmer-Merwara	87	1	31	..

*Includes 2,084 lbs. for 1935-36.

† This represents issues made by the Public Health Department. In addition quinine treatment and cinchona febrifuge amounting to 3,005 lbs. were sold by the Medical Store Depot, Rangoon, during 1934-35.

Appendix III

relating to

Section III.

TABLE A.—MATERNAL DEATH RATES PER 1,000 BIRTHS RECORDED IN CERTAIN TOWNS.

	1935. Deaths.	1935. Rate p. m.
Delhi.		
Delhi City	82	5
Delhi Ntd. Area	17	19
United Provinces.		
Lucknow	73	6
Agra	77	6
Cawnpore	137	11
Allahabad	53	6
Benares	139	13
Moradabad	78	13
Aligarh	27	8
Bareilly	38	6
Saharanpur	48	12
Hathras	19	8
Muttra	42	13
Muzaffarnagar	10	6
Meerut	22	6
Jhansi	24	6
Central Provinces.		
Nagpur	124	11
Amraoti	37	14
Raipur	33	18
Burhanpur	31	14
Akola	56	25
Jubbulpore	57	9
Khamgaon	9	9
Bombay Presidency.		
Bombay City	195	6
Ahmedabad	135	8
Karachi	47	4
Surat	54	9
Sukkur	30	13
Shikarpur	63	29
Hyderabad	22	6
Poona	19	3
Larkana	35	39
Nasik	4	3
Sholapur	91	13
Satara	12	21
Ahmednagar	25	12

	1935. Deaths.	1935. Rate p. m.
Madras Presidency.		
Chingleput	19	23
Tanjore	72	26
Guntur	83	29
Nellore	63	27
Negapatam	39	25
Nandyal	20	23
Anantapur	17	28
Mayavaram	20	18
Kurnool	16	9
Cuddapah	17	18
Kumbakonam	28	13
Tinnevelly	24	12
Cuddalore	49	23
Trichinopoly	57	11
Conjeeveram	63	24
Calicut	50	13
Rajahmundry	46	20
Palamcottah	27	14
Madura	135	16
Vellore	64	20
Cocanada	10	6
Tuticorin	36	16
Bezwada	37	14
Ellore	30	14
Madras	295	10
Burma.		
Mandalay	69	9
Moulmein	34	17
Rangoon Town	58	6
Myingyan	19	17
Akyab	4	6
Prome	14	13
Pegu	12	14
Coorg.		
Mercara	1	5

TABLE B.—MATERNITY AND CHILD WELFARE CENTRES IN RURAL AND URBAN AREAS.

	Centres maintained by															
	Govt.		Local and Municipal bodies.		Other Agencies.		Total.		Trained visitors.		Trained midwives.		Trained *dais.*	
	R	U	R	U	R	U	R	U	R	U	R	U	R	U
Total .	15	7	262	247	49	207	326	461	51	225	1,209	1,254	2,357	2,220
N.-W. F. P. . . .	..	..	..	1	..	1	..	2	..	1	..	3	10	5
Punjab. . . .	..	1	16	16	5	38	21	55	20	58	..	16	304	714
Delhi	..	..	7	15	1	3	8	18	1	13	7	5	1	17
U. P.	..	..	120	109	..	..	120	109	6	14	151	142	350	524
B. & O. . . .	..	6	..	6	4	8	4	20	..	8	4	20	..	7
Bengal . . .	9	..	12	16	2	12	23	28	2	10	24	76	2,411	484
C. P.	..	..	..	7	14	43	14	50	9	49	5	1	23	319
Bombay . . .	..	..	34	16	8	42	42	58	1	22	42	143	251	134
Madras. . . .	4	..	73	57	14	27	91	84	11	34	852	707	4	12
Coorg	..	..	..	..	..	1	..	1	..	..	..	..	3	..
Assam	..	..	..	..	..	5	..	5	..	2	2	11	..	4
Burma	2	..	..	4	1	27	3	31	1	14	122	130	..	..
Ajmer-Merwara . .	..	..	..	..	..	..	..	..	..	..	..	..	..	..

Appendix IV

relating to

Section IV.

TABLE A.—EXPENDITURE ON PUBLIC HEALTH.

(i) *By the Government of India.*

	India general.	Baluchistan.	Other areas.	Total.
	Rs.	Rs.	Rs.	Rs.
Total	10,66,901	11,306	3,88,071	14,66,278
Public Health Establishment	3,48,549	9,306	12,911	3,70,766
Grants for Public Health Purposes	2,91,843	2,000	1,38,943	4,32,786
Expenses in connection with epidemic diseases	49,301	..	2,34,800	2,84,101
Bacteriological Laboratories	2,38,868	..	..	2,38,868
Pasteur Institutes	1,733	..	..	1,733
Works	1,36,607	..	1,417	1,38,024

(ii) *By the Provincial Governments.*

	Total.	Public Health establish-ment.	Grants for public health purposes.	Epidemic Diseases.	Bacteriological Laboratory.	Pasteur Institutes.	Works.
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Total	1,52,29,920	60,67,795	50,14,741	17,87,262	8,42,234	3,47,578	11,70,310
N.-W. F. P.	1,27,680	82,188	28,711	16,781	..	..	..
Punjab	10,43,729	6,01,894	2,83,026	1,14,108	19,491	25,210	..
U. P.	22,79,095	14,45,134	5,76,949	1,52,126	..	..	1,04,886
B. & O.	12,57,378	4,90,761	3,91,903	1,41,935	28,988	15,033	1,88,758
Bengal	35,99,109	6,97,296	24,53,574	3,13,524	88,660	40,969	5,086
C. P.	3,81,568	95,910	48,208	2,34,243	3,207	..	..
Bombay	24,21,352	8,71,198	2,39,613	1,47,094	2,81,354	33,241	8,48,852
Madras	23,92,872	12,40,843	6,24,764	93,669	3,92,895	36,853	3,848
Coorg	11,442	2,499	..	8,518	..	..	425
Assam	7,08,738	1,69,528	18,817	3,61,103	13,798	1,29,558	15,934
Burma	9,72,406	3,36,049	3,49,176	2,04,105	13,841	66,714	2,521
Shan States Federation	34,551	34,495	..	56	..	..	..

TABLE SHOWING THE DISTRIBUTION OF HEALTH STAFFS IN RURAL AND URBAN AREAS.

Rural Areas.

	Medical Officers of Health.				Epidemic Staff.	Sanitary and Health Inspectors.	Vaccinators.		School Medical Officers.	Other Health Staffs.
	Holding D. P. H.		Licentiates (L. P. Hs.)				M.	F.		
	Whole time.	Part time.	Whole time.	Part time.						
Total	136	1	61	...	593	1,237	5,591	45	12	876
N.-W. F. P.	...	...	...	...	2	...	24	...	...	2
Punjab	28	...	...	...	42	49	441	...	...	17
Delhi	...	1	...	...	...	2	3	...	5	10
U. P.	40	...	29	...	43	158	821	...	...	9
B. & O.	5	...	1	...	82	36	424	1	7	48
Bengal	29	...	11	...	236	572	1,851	37	...	674
C. P.	...	...	...	...	35	...	274	...	...	36
Bombay	1	...	2	...	61	5	379	...	...	51
Madras	29	...	17	...	16	350	652	6	...	...
Coorg	...	...	1	...	...	1	7	...	...	...
Assam	...	...	...	...	45	1	402	1	...	...
Burma	4	...	...	...	31	63	303	...	...	29
Ajmer-Merwara	...	...	...	...	...	...	10	...	...	...

Urban Areas.

	Medical Officers of Health.				Sanitary and Health Inspectors.	Vaccinators.		Inspectors of Vaccination.	School Medical Officers.	Other Health Staffs.
	Holding D. P. H.		Licentiates (L. P. Hs.)			M.	F.			
	Whole time.	Part time.	Whole time.	Part time.						
Total	129	6	91	22	1,083	954	37	93	48	690
N. W. F. P.	1	...	...	...	8	5	1	6	5	...
Punjab	12	2	1	18	128	96	11	6	7	74
Delhi	1	3	...	...	16	8	...	...	3	8
U. P.	21	...	13	...	180	185	...	...	13	...
B. & O.	5	...	...	1	28	40	1	13	...	12
Bengal	22	...	1	2	108	152	12	6	5	125
C. P.	2	...	1	...	56	81	...	...	...	3
Bombay	22	...	46	...	127	61	2	2	9	252
Madras	26	...	23	...	279	175	10	17	6	40
Coorg	...	...	...	...	2	2	...	1	...	...
Assam	1	...	...	1	14	49	...	41	...	97
Burma	15	1	6	...	125	93	...	...	...	57
Ajmer-Merwara	1	...	...	...	12	7	...	1	...	22

Appendix V

relating to

Section VI.

TABLE A.—VACCINATION OPERATIONS PERFORMED IN BRITISH INDIA AND IN DIFFERENT PROVINCES.

Province.	Population.	Operations performed.			Percentage of success.		Children successfully vaccinated.		Total cost.	Average cost per successful case.	Rate of successful vaccinations per 1,000 of population.	Percentage of annual births successfully vaccinated.
		P.	R.	Total.	P.	R.	Under 1 year.	1 to 6 years.				
British India . .	269,668,192	10,623,029	14,733,696	25,356,725	97	48	4,332,547	4,454,385	Rs. 33,97,008	Rs. A. P. 0 3 8	56	45
N.-W. F. P. . .	3,762,678	140,872	99,638	240,510	99	85	78,558	47,461	27,543	0 2 1	56	103
Punjab . . .	23,427,835	1,019,039	2,466,896	3,485,935	99	67	782,431	137,982	3,88,095	0 2 10	97	73
Delhi . . .	636,246	21,803	27,312	49,115	98	60	17,323	2,580	8,220	0 3 11	52	60
U. P. . . .	48,408,763	1,605,718	366,740	1,972,458	83	58	977,880	451,738	3,87,860	0 3 9	34	56
B. & O. . .	37,677,576	1,153,538	877,721	2,031,259	93	61	316,809	760,486	67,733	0 0 9	40	24
Bengal . . .	50,114,002	2,907,210	6,206,882	9,114,092	88	36	340,560	1,670,842	4,59,373	0 1 6	95	21
C. P. . . .	15,507,723	565,836	168,569	734,405	97	53	425,051	96,372	1,89,839	0 5 2	38	61
Bombay . . .	21,855,300	728,801	498,719	1,227,520	99	42	498,756	177,840	5,49,621	0 11 4	32	62
Madras . . .	45,204,545	1,418,663	2,857,227	4,275,890	96	25	630,862	548,006	7,55,652	0 6 9	40	38
Coorg . . .	163,327	6,871	13,676	20,547	97	63	1,396	3,963	5,849	0 6 4	90	33
Assam . . .	9,247,857	428,982	423,703	852,685	93	65	70,292	265,302	1,19,139	0 3 6	67	29
Burma . . .	13,102,048	600,475	721,792	1,322,267	98	38	173,444	288,419	4,29,278	0 9 0	58	43
Ajmer-Merwara .	560,292	25,221	4,821	30,042	97	91	19,185	13,394	8,806	0 4 10	52	90

P = Primary.
R = Revaccinations.

Appendix VI.

relating to

Section VII.

TABLE A.—NUMBER OF TOWNS HAVING WATERSUPPLIES IN DIFFERENT PROVINCES.

	Towns having a population of 50,000.		Towns having a population of 30,000—50,000.		Towns having a population below 30,000.		Total.			
	No. of towns.	Towns having a protected water supply.	No. of towns.	Towns having a protected water supply.	No. of towns.	Towns having a protected water supply.	No. of towns.	Aggregate population.	Towns having a protected water supply.	Population of towns included in col. 10.
1	2	3	4	5	6	7	8	9	10	11
British India—	77	61	86	50	1,131	149	1,294	24,661,056	260	13,223,557
N.-W. F. P.	1	1	1	1	15	6	17	299,284	8	206,203
Punjab	8	6	11	6	158	23	177	2,922,754	35	1,442,755
Delhi	2	2	...	...	4	3	6	447,442	5	439,180
U. P.	17	11	13	3	409	8	439	5,423,472	22	1,655,252
B. & O.	6	4	8	5	64	2	78	1,653,837	11	783,553
Bengal	4	4	17	15	96	27	117	2,295,835	46	1,382,507
C. P.	2	2	7	4	103	3	112	1,679,546	9	550,338
Bombay	11	10	11	6	135	27	157	4,432,502	43	3,105,339
Madras	22	18	16	9	43	14	81	3,674,755	41	2,610,789
Coorg	...	...	...	...	2	1	2	9,827	1	5,995
Assam	...	...	...	...	25	10	25	194,474	10	111,879
Burma	3	3	2	1	73	24	78	1,447,129	28	908,280
Ajmer-Merwara	1	...	...		4	1	5	180,199	1	21,397

Appendix VII

relating to

Section VIII.

List of Scientific Papers by Research workers under the Government of India, the Indian Research Fund Association, Provincial Governments and Indian States published during 1935.

A.—(i) Papers published in the Indian Journal of Medical Research (I. J. M. R.) and its Memoirs.

Ahmad, B.

The vitamin C value of some common Indian fruits, vegetables and pulses by the chemical method. (Volume XXII, No. 4).

Ahuja, M. L.

A short note on an epizootic amongst rabbits due to *Salmonella œrtrycke*. (Volume XXII, No. 3).

A short note on viability of bacterial cultures. (Volume XXII, No. 3).

Specificity of antivenomous sera with special reference to sera prepared with venoms of Indian and South African snakes. (Volume XXII, No. 3).

Ahuja, M. L., and Naranjan Singh.

On types of meningococci isolated during the 1934 epidemic of cerebro-spinal meningitis in India, with special reference to the manufacture of a prophylactic vaccine. (Volume XXII, No. 4).

Basu, K. P., and Sarkar, S. N.

Biochemical investigations on different varieties of Bengal rice. Part I. The chemical composition of various rice samples. (Volume XXII, No. 4).

Biochemical investigations on different varieties of Bengal rice. Part II. Enzymic digestibility of rice starch. (Volume XXII, No. 4).

Bhaskara Menon, T., and Annamalai, D. R.

The incidence of hepatic cirrhosis in South India. (Volume XXII, No. 4).

A note on splenic enlargement in malignant hepatoma. (Volume XXII, No. 4).

Bhatnagar, S. S., and Kartar Singh.

Bacteriological studies in acute lobar pneumonia due to pneumococcus and *B. pneumoniæ* Friendlander. (Volume XXIII, No. 2).

Bose, A. C.

A modified method of estimating arsenic-content of Indian food-stuffs. (Volume XXII, No. 4).

Bose, J. P.

Arterio-venous sugar difference in diabetes mellitus: Its value in adjudging the severity of the disease. (Volume XXIII, No. 1).

Chakraborty, R. K.

The vitamin C content of some Indian food-materials. (Volume XXIII, No. 2).

Chatterjee, D. D.

The motor functions of the bowel in avitaminosis B and in starved animals. (Volume XXIII, No. 1).

Chopra, R. N., and Chopra, G. S.

Opium habit in India. Studies on the physical and mental effects produced by opium addiction. (Volume XXIII, No. 2).

Chopra, R. N., Chowhan, J. S., and De, N. N.

An experimental investigation into the action of the venom of *Echis carinata*. (Volume XXIII, No. 2).

Chopra, R. N., De, N. N., and Chakerburty, M.

The pharmacological action of tylophorine: the alkaloid occurring in *Tylophora asthmaticus*. (Volume XXIII, No. 1).

Chopra, R. N., Mukherjee, S. N., and Chopra, G. S.

Studies on the protein fractions of blood sera. Part II. Blood sera of opium addicts. (Volume XXII, No. 3).

Chopra, R. N., Mukherjee, S. N., and Gupta, J. C.

Studies on the protein fractions of blood sera. Part IV. Epidemic dropsy. (Volume XXIII, No. 2).

Chopra, R. N., Gupta, J. C., and Roy, A. C.

Action of emetine on the activity of the adrenal and thyroid glands. (Volume XXII, No. 4).

Chopra, R. N., and Das, N. N.

An improved method of recording amplified electrical changes in tissues for pharmacological work. (Volume XXII, No. 4).

Cunningham, J., and Fraser, A. G. L.

Further observations on Indian relapsing fever. Part II. The Serology of relapsing fever in human beings. (Volume XXII, No. 4).

Chopra, R. N., Mukherjee, S. N., and Sen, B.

Studies on the protein fractions of blood sera. Part III. Malarial sera during and after the rigor stage. (Volume XXII, No. 3).

Das, N., and Guha, B. C.

Observations on the chemistry of oxytocin (the oxytocic hormone of the pituitary gland). Part IV. (Volume XXII, No. 3).

De, N. K.

Spectrographic examination of some Indian milks. (Volume XXII, No. 3).

A spectrographic study of the vitamin A content of some oils and fats. (Volume XXII, No. 3).

A spectrographic analysis of thyroid glands. (Volume XXIII, No. 2).

Vitamin A activity and ultra-violet light. A simple spectrophotometric method of assaying vitamin A and carotene. (Volume XXIII, No. 2).

Dey, B. B., Pillay, P. P., David, J. C., and Rajmañikam, N.

The chemistry and pharmacological action of *Toddalea aculeata*. (Volume XXII, No. 4).

Ghosh, A. R., and Guha, B. C.

Vitamin A values of Indian fish liver oils determined biologically and tintometrically. (Volume XXII, No. 3).

Ghosh, B. N.

The absorption of antigens by anti-bodies or *vice versa*. Part I. (Volume XXIII, No. 1).

Ghosh, S., Chopra, R. N., and Dutt, A.

Chemical examination of the bark of *Morniga pterygosperma*. (Volume XXII, No. 4).

Goyle, A. N., Vasudevan, A., and Krishnaswamy, K. G.

The pathology of some uncommon enlargements of lymph nodes illustrated by five cases. (Volume XXIII, No. 2).

Hughes, T. A.

On the nature of pulmonary tuberculosis in adult Punjabis. (Volume XXII, No. 4).

Iyengar, M. O. T.

The identification of the common rat-fleas of India. (Volume XXII, No. 4).

Karve, J. V., and Sundararajan, E. R.

Endemicity of plague in Mysore State. Part I. (Volume XXIII, No. 1).

Knowles, R., and Basu, B. C.

Nuclear division in malarial sporocites. (Volume XXII, No. 3).

A blood-inhabiting spirochæte of the guinea-pig. (Volume XXII, No. 3).

Knowles, R., and Das Gupta, B. M.

The coccidia of lizards. (Volume XXII, No. 4).

An entamœba of the Gecko. (Volume XXII, No. 4).

Krishnan, K. V., Chopra, R. N., and Mukherjee, S. N.

Contributions to protozoal immunity. Part III. The Rôle of electrical charge in the phagocytosis of red cells. (Volume XXIII, No. 1).

Linton, R. W., Mitra, B. N., and Seal, S. C.

Studies on the antigenic structure of *vibrio cholerœ*. Part VIII. The specific carbohydrate content and serology of the acid-soluble fractions. (Volume XXII, No. 4).

Linton, R. W., Shrivastava, D. L., and Mitra, B. N.

Studies on the antigenic structure of *vibrio cholerœ*. Part IX. Dissociation and changes in chemical structure. (Volume XXII, No. 4).

Linton, R. W., Harwant Singh, and Seal, S. C.

A study of vibrio filtrates. (Volume XXII, No. 4).

Mallick, S. M. K.

The applicability of flocculation tests for standardization of antivenene. (Volume XXIII, No. 2).

Mitra, P. N.

Blood groups and heredity. (Volume XXII, No. 3).

Napier, L. E., and Das Gupta, C. R.

Hæmatological studies in Indians. Part I. Hæmoglobin estimation methods. (Volume XXII, No. 4).

Hæmatological studies in Indians. Part II. Normal standards for a Bengali Town population. (Volume XXIII, No. 1).

Hæmatological studies in Indians. Part III. Normal standards for a tea-garden coolie population. (Volume XXIII, No. 1).

Hæmatological studies in Indians. Part IV. Fractional gastric analysis in normal Indians. (Volume XXIII, No. 2).

Narayana Menon, V. K.

The non-glucose reducing bodies in blood. Part II. The vitamin C fraction. (Volume XXIII, No. 2).

Pal, R. K., and Prasad, S.

The effects of some products of digestion and accessory substances on the rhythmical contractions of the isolated mammalian intestines. (Volume XXIII, No. 2).

Pandalai, N. G.

Observations on the pathogenicity of the local strains of *spirillum minus* to guinea-pigs. (Volume XXII, No. 3).

Pandit, C. G., Wright, R. E., Sanjiva, Rao, R., and Satyanathan.

Preliminary note on the investigation of trachoma by the technique of culture on the chorio-allantoic membrane of the embryo-chick. (Volume XXIII, No. 2).

Radhakrishna Rao, M. V.

Histopathology of the liver in '*infantile biliary cirrhosis*': (Volume XXIII, No. 1).

Raghavachari, T. N. S., and Seetharama Iyer, P. V.

A note on the methylene-blue reduction test for differentiating between *coli* and *ærogenes* types of lactose-fermenting organisms in water and fæces. (Volume XXIII, No. 2).

Rahman, S. A., and Abhyankar, R. N.

Waves of rhythmic contractions and relaxations in the perfusion pressure tracings of the blood vessels of the frog (*Rana-tigrina*), with special reference to the action of adrenaline, ergotoxine, pituitrin, barium chloride, janus green and ephedrine. (Volume XXII, No. 4).

Raja, K. C. K. E.

Probable trend of population-growth in India. (Volume XXIII, No. 1).

Ranganathan, S.

Influence of cereals on calcium, magnesium and phosphorus assimilation. A preliminary note. (Volume XXIII, No. 1).

The vitamin C content of some Indian food-stuffs. (Volume XXIII, No. 1).

Ranganathan, S., and De, N. K.

Spectrographic examination of urinary and biliary calculi. (Volume XXIII, No. 1).

Ratnagiriswaran, A. N., and Venkatachalam, K.

The chemical examination of *tylophora asthmatica* and isolation of the alkaloids tylophorine and tylophorinine. (Volume XXII, No. 3).

Rice, E. M.

A preliminary epidemiological study of cholera with special reference to Assam and suggestions for further investigations. (Volume XXIII, No. 2).

Russell, A. J. H., and Raja, K. C. K. E.

The population problem in India. (Volume XXIII, No. 2).

Sanjiva Rao, R.

A short note on the use of glycerinated medium in the technique of single-cell isolation of facteria. (Volume XXIII, No. 1).

Sankaran, G.

A simple form of electro-dialyser. (Volume XXIII, No. 1).

Sankaran, G., and Beer, W. A.

The effect of exposure of suspensions of rabies-infected brain to radiation from a quartz Mercury vapour lamp. (Volume XXII, No. 3).

Sankaran, G., and Patnaik, M.

The molecular formula of thyreoglobulin. (Volume XXIII, No. 1).

Shortt, H. E.

Morphological studies on rabies. Part II. Negri bodies in the *hippocampus major* in street virus infections. (Volume XXIII, No. 2).

Shortt, H. E., and Brooks, A. G.

Note on rabies fixed virus as an antigenic agent when inactivated by the photodynamic action of methylene blue. (Volume XXII, No. 3).

Shortt, H. E., and Mallick, S. M. K.

Detoxication of snake venom by the photodynamic action of methylene blue (Volume XXII, No. 3).

Shortt, H. E., McGuire, J. P., Brooks, A. G., and Stephens, E.D.

Anti-rabic immunization: Probable lines of progress in improvement of methods (Volume XXII, No. 3).

Shortt, H. E., Poole, L. T., and Stephens, E. D.

Note on some experiments with sandfly fever blood and serum. (Volume XXIII, No. 1).

Shortt, H. E., Sinton, J. A., and Swaminath, C. S.

The probable vector of oriental sore in the Punjab. (Volume XXIII, No. 1).

Shortt, H. E., and Swaminath, C. S.

The presence of *leishmania donovani* in the nasal secretion of cases of Indian kala-azar. (Volume XXIII, No. 2).

Taylor, J., and Ahuja, M. L.

Toxicity tests of novarsenobenzene in white mice bred in India. (Volume XXIII, No. 1).

Serological relationships of certain vibrios isolated from non-cholera sources in India. (Volume XXIII, No. 1).

Serological variations in vibrios from non-cholera sources. (Volume XXIII, No. 2).

Taylor, J., and Mallick, S. M. K.

Observations on the neutralization of the *hæmorrhagin* of certain viper venoms by antivenene. (Volume XXIII, No. 1).

Observations on poisoning with the venom of *echis carinata* and its treatment with a heterologous antivenene. (Volume XXIII, No. 1).

Taylor, J., Mallick, S. M. K., and Ahuja, M. L.

The coagulant action on blood of *dabois* and *echis* venoms and its neutralization. (Volume XXIII, No. 1).

Venkatachalam, K., and Ratnagiriswaran, A. N.

The action of anterior pituitary extract and its effect on blood sugar. (Volume XXII, No. 3).

Vishwa Nath and Grewal, K. S.

Cancer in India. (Volume XXIII, No. 1).

Webster, W. J.

A Note on Williams' modification of Eijkman's test as applied to Madras waters. Volume XXII, No. 3).

Streptococcus fæcalis in Madras waters. (Volume XXII, No. 3).

Webster, W. J., and Raghavachari, T. N. S.

Comparative results of the bacteriological examination of Madras waters at the source and after transport to a distant laboratory. (Volume XXIII, No. 1).

Wilson, H. E. C., and Mookerjee, S. L.

The absorption of rice and *atta* protein in digestion and the question of the fæcal residue as a medium for intestinal putrefaction. (Volume XXIII, No. 2).

Some possible factors in the causation of vesical calculus in India. The composition of the human urine on different diets. (Volume XXIII, No. 2.)

Wright, R. E., Seetharama Iyer, P. V. *and Pandit, C. G.*

Description of an adult filaria (male) removed from the anterior chamber of the eye of man. (Volume XXIII, No. 1).

A.—(ii) Papers published in the Records of the Malaria Survey of India.

Covell, G.

The effect of paris green dusting on rice crops. (Volume V, No. 2).

Covell, G., and Baily, J. D.

Malaria in Sind. Part XIII. Malaria in Hala taluka, Hyderabad district, and in Kandiaro, Sinjhoro and Shahdadpur talukas, Nawabshah district. (Volume V, No. 2).

Malaria in Sind. Part XIV. The seasonal incidence of infection with the different species of malaria parasite in Larkana. (Volume V, No. 2).

Covell, G., Baily, J. D., and Vidya Prasad.

An experiment with paris green in a hyperendemic village in Sind. (Volume V, No. 2).

Ganguli, A. C.

Observations on malaria-carrying mosquitoes of Calcutta. (Volume V, No. 3).

Ghosh, B. N., and Sinton, M. A.

Quantitative changes in the proteins of the blood sera of monkeys infected with malarial plasmodia. (Volume V, No. 2).

Gupta, P., Bhattacharya, S. R., and Datta, N. C.

Malaria survey report on Nijpat Jaintiapur, Sylhet district, Assam. (Volume V, No. 3).

Malaria survey report of Sylhet town, Sylhet district, Assam. (Volume V, No. 3).

Hicks, E. P.

Atebrin musonate: A note on the rate of absorption and on the local effect of intramuscular injection. (Volume V, No. 2).

Hicks, E. P. and Diwan Chand.

The relative clinical efficacy of totaquina and quinine. (Volume V, No. 1).

Jaswant Singh, and Harbhagwan.

Failure to produce infection in two species of the lower oriental monkeys by the injection of malarial sporozoites from naturally infected anophelines. (Volume V, No. 4).

Karamchandani, P. V.

The vertex and the Phallosome leaflets of *anopheles maculipennis* Meigen. (Volume V, No. 1).

The effect of heat and atmospheric humidity on all stages of *culex fatigans*. (Volume V, No. 1).

Kehar, N. D.

Observations on the absorption and excretion of atebrin. (Volume V, No. 4).

The influence of food in the stomach on the absorption and excretion of atebrin. (Volume V, No. 4).

Lindberg, K.

Notes on malaria on the Barsi light railway (Deccan). (Volume V, No. 1).

Mulligan, H. W.

Some notes on malaria in Baluchistan. (Volume V, No. 3).

Pandit, S. R.

The morphology of malarial parasites. (Volume V, No. 4).

Puri, I. M.

Schematic table for the indentification of the Indian anopheline mosquitoes. Part I. Adults. (Volume V, No. 3).

Schematic table for the indentification of the Indian anopheline mosquitoes. Part II. Full-grown larvæ. (Volume V, No. 3).

Rice, E. M.

Observations on malaria in Assam, with special reference to cold weather and pre-monsoon anti-larval control. (Volume V, No. 4).

Anti-larval oil application by a " One man " brushing method. (Volume V, No. 4).

Sen, P.

Anopheles breeding in relation to rice cultivation in lower Bengal. (Volume V, No. 1).

Observations on the emergence of anophelines. (Volume V, No. 2).

An instance of species anomaly amongst anophelines. (Volume V, No. 3).

Some peculiarities in the breeding habits of the common *aedes* (*stegomyia*) Mosquitoes of Calcutta. (Volume V, No. 3).

Sinton, J. A.

A method for cleaning the capillary tubes used for the enumeration of malarial parasites in the blood. (Volume V, No. 1).

What malaria costs India, nationally, socially and economically. Part I. (Volume V, No. 3).

What malaria costs India, nationally, socially and economically. Part II. (Volume V. No. 4).

Studies in immunity in malaria. Part V. The nature of the tolerance shown by *silenus irus* to infection with *P. knowlesi*. (Volume V, No. 4).

Sinton, J. A., and Harbhagwan.

Studies in immunity in malaria. Part IV. The results of multiple heterologous superinfections, with a discussion of their relationship to some epidemiological problems and to the general principles of treatment. (Volume V, No. 3).

Sinton, J. A., and Majid, S. A.

The dispersion of anopheline larvæ by the flow of streams, and the effect of larvicide in preventing this. (Volume V, No. 1).

Sinton, J. A., and Wats, R. C.

The efficacy of various insecticidal sprays in the destruction of adult mosquitoes. (Volume V, No. 3).

B.—Papers published in the Indian Medical Gazette during 1935—Volume LXX.

Ahmad, B.

Observations on the vitamin A value of halibut-liver oil. (Page 70).

Andreasen, A. T.

The Etherington-Wilson technique of intrathecal nerve-root block. (Page 683).

Ardeshir, E. A. R.

Investigations on cerebro-spinal fever in Nasirabad (Rajputana) during the period 1931 to 1934. Part I. (Page 435).

Bakhsh, I., and Andreasen, A. T.

The treatment of lobar pneumonia with intravenous injections of alcohol. (Page 673).

Banerjee, P.

The surgery of the ruptured spleen. (Page 273).

Banerjee, P. N.

Evipan-sodium (intravenous anæsthetic). (Page 380).

Bose, J. P.

Arterial *versus* venous blood sugar—arterio-venous sugar difference as a criterion of the severity of diabetes. (Page 361).

Brahmachari, B. B.

Values of constants in the analysis of *ghi* for detection of adulteration. (Page 71).
Constants of mustard oil. (Page 329).

Chakravarti, D. C.

Thrombo-angiitis obliterans. (Page 16).

Chopra, R. N.

Drug addiction in India and its treatment. (Page 121).

Drug adulteration and spurious drugs in India. (Page 693).

Chopra, R. N., and Bhattacharya, S. N.

Observations on epidemic dropsy cases admitted into the tropical diseases hospital from 1922 to 1933. (Page 498).

Chopra, R. N., and Bose, J. P.

Calcinosis cutis. (Page 375).

Chopra, R. N., and Chaudhuri, R. N.

Some observations on the toxicity of synthetic anti-malaria remedies. (Page 1).

A preliminary report on an epidemic dropsy outbreak in Purulia. (Page 481).

Cutænous manifestations of epidemic dropsy. Part I. A clinical study. (Page 493).

Chopra, R. N., Chaudhuri, R. N., and Panja, D.

Cutænous manifestations of epidemic dropsy. Part II. A histopathological study. (Page 496).

Chopra, R. N., and Chopra, G. S.

Habitual use of barbituric acid derivatives in India. (Page 188).

Chopra, R. N., and Chowhan, J. S.

Snake venoms in pharmacology and therapeutics. (Page 445).

Chopra, R. N., and Ganguli, S. K.

Chemotherapeutic studies on plasmodium infection in monkeys. No. 5—Action of tebetren. (Page 313).

Chopra, R. N., Ganguli, S. K., and Roy, A. C.

On the relationship between the quinine concentration in the circulating blood and parasite count in monkey malaria. (Page 62).

Chopra, R. N., and Roy, A. C.

On the estimation of minute quantities of atebrin in the blood. (Page 504).

Chopra, R. N., Sen, B., and Ganguli, S. K.

Tebetren in Indian strains of malaria. (Page 362).

Chopra, R. N., Sen, B., and Sen, G.

Amibiarson in the treatment of chronic intestinal amœbiasis. (Page 324).

Cruickshank, M. M.

Lumbar sympathectomy in the treatment of circulatory diseases. (Page 553).

De, M. N., and Chatterjee, K. D.

Pathology of epidemic dropsy. (Page 489).

Dey, N. C., and Maplestone, P. A.

Ringworm of the scalp in India. (Page 541).

Dharmendra, and Napier, L. E.

Some biochemical observations on asthma. (Page 301).

Drummond, J. C.

A small X-ray building for a mofussil hospital. (Page 392).

Ghosh, L. M., and Maplestone, P. A.

Infective warts and their treatment. (Page 441).

Goyle, A. N., Krishnaswamy, K. G., and Vasudevan, A.

Tuberculosis of the mammery gland. (Page 609).

Goyle, A. N., Vasudevan, A., and Krishnaswamy, K. G.

Ewing's sarcoma— aclinical and pathological study of a case. (Page 371).

Gupta, B. M.

A note on the use of saccharine as a sweetening agent from the point of view of public health. (Page 512).

Gupta, S. P.

Nephrosis : Its nature and incidence in Indians. (Page 258).

Hodge, E. H. V.

The disorders of digestion—the commoner digestive disorder of children in India. (Page 601).

James, J. F.

A simple fly trap. (Page 23).

Fumigation and trapping of mosquitoes. (Page 143).

Kirwan, E. O'G.

Corneal transplantation on opaque corneas. (Page 61).

The development of ophthalmology in Bengal. (Page 154).

The ocular complications of epidemic dropsy. (Page 485).

Krishnan, K. V.

The reticulo-endothelial system in malarial hæmoglobinuria of monkeys. (Page 193).

Krishnan, K. V., and Ghosh, B. M.

The reticulo-endothelial system in malarial hæmoglobinuria of monkeys. Part II. (Page 197).

Lal, R. B., and Yacob, M.

A note on an epidemic of cerebrospinal fever in a closed community. (Page 252).

Linton, R. W., and Seal, S. C.

The effect of the use of living or dead suspensions of vibrios on the agglutination titre. (Page 68).

Mackey, G.

Some observations on the lactose-fermenting organisms encountered in the bacteriological analysis of water in the tropics. (Page 140).

Mahadevan, V., and Menon, T. B.

Congenital hydronephrosis due to an abnormal attachment of the renal fascia (of Gerota). (Page 321).

Maplestone, P. A.

The rate of development of hookworm eggs. (Page 368).

The essentials of bore-hole latrine construction. (Page 394).

Maplestone, P. A., and Mukerji, A. K.

The passage of hookworms after treatment. (Page 320).

Mathur, H. G. D.

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Appendix VIII

relating to

Section IX

TABLE A.—NUMBER OF HOSPITALS AND DISPENSARIES AT WORK IN BRITISH INDIA AND DIFFERENT PROVINCES.

	Classes I, III and IV.		Classes II and VI		Class V.		Total.		Grand Total.	Average population served by each institution.	
	R.	U.	R.	U.	R.	U.	R.	U.		R.	U.
British India	3,620	1,633	345	494	348	199	4,313	2,326	6,639	61,874	12,039
N.-W. F. P.	35	21	6	13	3	7	44	41	85*	46,339	9,419
Punjab	595	187	88	82	3	4	686	273	959	29,902	11,235
U. P.	301	202	20	92	62	21	383	315	698	115,050	17,621
B. & O.	466	73	44	41	54	12	564	126	690	63,872	13,126
Bengal	624	422	26	93	99	78	749	593	1,342	66,908	6,213
C. P.	113	119	12	41	39	15	164	175	339	84,264	9,648
Bombay	157	258	27	52	17	23	201	333	534	103,672†	15,665†
Madras	1,004	191	54	23	58	33	1,116	247	1,363	36,539	27,598
Coorg	9	2	..	..	3	..	12	2	14	12,792	4,913
Assam	176	39	22	22	6	2	204	63	267	45,283	5,014
Burma	130	96	41	30	2	2	173	128	301	75,995	11,875
Baluchistan	10	23	5	5	2	2	17	30	47	..	..

* Excluding 33 dispensaries in the Agencies.
† Do not include Aden and Persian Gulf.

TABLE B.—NUMBER OF BEDS IN HOSPITALS AND DISPENSARIES.

	All classes of Institutions.			State-public, local fund and private aided hospitals and dispensaries.		
	Males.	Females and Children.	Total.	Males.	Females and Children.	Total.
British India	43,871	25,418	69,289	37,134	22,656	59,790
N.-W. F. P.	1,686	481	2,067	846	397	1,243
Punjab	7,076	4,264	11,340	5,469	4,024	9,493
Delhi	330	506	836	272	506	778
U. P.	6,071	3,049	9,120	4,417	2,707	7,124
B. & O.	4,052	1,891	5,943	2,770	1,517	4,287
Bengal	2,344	1,379	3,723	4,270	2,426	6,696
C. P.	1,853	1,164	3,017	1,394	897	2,291
Bombay	4,897	3,519	8,416	4,277	3,043	7,320
Madras	7,505	6,277	13,782	6,612	4,598	11,210
Coorg	88	66	154	88	66	154
Assam	1,266	401	1,667	759	328	1,087
Burma	6,157	2,272*	8,429	5,484	2,013	7,497
Baluchistan	546	149	795	476	134	610

* Including 8 special beds for children.

TABLE C.—NO. OF BEDS FOR FEMALES IN GENERAL AND FEMALE HOSPITALS AND DISPENSARIES OF CLASSES I, III AND IV.

	General hospitals.	Female hospitals.	Total.	Female hospitals. Total in-door patients treated.	Female hospitals. In-door daily average.
Total	15,949	5,807	22,084	126,560	3,982·90
N.-W. F. P.	283	114	397	2,642	106·04
Punjab	2,729	1,295	4,024	20,002	737·09
U. P.	1,307	1,400	2,707	24,308	799·30
B. & O.	1,298	219	1,517	2,898	140·81
Bengal	2,020	406	2,426	9,126	224·54
C. P.	579	318	897	6,002	221·93
Bombay	2,243	800	3,043	23,190	629·35
Madras	3,578	1,020	4,598	34,121	1,012·17
Assam	..	..	328	..	..
Burma	1,809	204	2,013	4,009	110·00
Baluchistan	103	31	134	262	1·67

Class I.—State public.
Class III.—Local and Municipal Fund.
Class IV.—Private aided.

TABLE D.—SURGICAL OPERATIONS DONE IN CLASSES I, III AND IV INSTITUTIONS.

	Operations performed during the year. Principal.	Operations performed during the year. Secondary.	Cured.	Died.
British India	25,69,967	82,643	23,98,221	9,200
N.-W. F. P.	1,17,399	4,712	1,15,741	167
Punjab	5,79,254	13,188	5,48,241	1,102
Delhi	27,740*	..	..	501
U. P.	3,32,594	10,410	3,03,210	1,423
B. & O.	2,89,149	3,861	2,78,856	509
Bengal	1,82,803	27,696	1,66,825	1,609
C. P.	1,07,201	1,925	1,05,038	298
Bombay	1,69,319	4,667	1,48,005	1,068
Madras	6,02,304*	..	5,77,334	1,660
Coorg	4,616	2	4,584	8
Assam	24,084	43	23,711	82
Burma	1,20,655	16,088	1,14,222	751
Baluchistan	12,849	51	12,454	22

* Including Secondary operations.

TABLE E.—INCOME OF HOSPITALS AND DISPENSARIES.

	Total income Classes I, III and IV institutions.	Contributions by	
		Government.	Municipal and local funds.
	Rs.	Rs.	Rs.
British India	4,63,22,476	1,87,78,552	1,48,62,809
N.-W. F. P.	7,00,820	4,03,882	2,52,892
Punjab	52,06,207	21,07,391	22,64,684
Delhi	8,14,493	3,03,887	2,57,465
U. P.	39,19,370	9,65,405	18,07,792
B. & O.	34,91,716	9,04,048	16,09,352
Bengal	75,86,542	21,42,830	26,24,711
C. P.	26,74,249	7,05,737	2,92,992
Bombay	63,51,707	27,68,688	20,14,590
Madras	81,61,644	53,59,870	18,54,640
Coorg.	1,09,874	48,832	53,489
Assam	9,99,433	4,36,888	3,24,284
Burma	60,36,868	23,90,722	14,95,388
Baluchistan	2,69,553	2,40,372	10,030

TABLE F.—EXPENDITURE ON THE MAINTENANCE OF HOSPITALS AND DISPENSARIES.

	Total Expenditure.	Expenditure on			
		Medical officers.	Nurses.	Diet.	Medicines.
	Rs.	Rs.	Rs.	Rs.	Rs.
British India	3,92,54,573	1,01,12,991	38,92,698	30,26,610	41,60,051
N.-W. F. P.	6,85,439	1,78,201	41,241	29,718	1,02,980
Punjab	49,92,301	15,06,348	3,15,316	1,42,135	6,13,160
Delhi	7,89,085	1,03,030	1,68,336	44,486	98,584
U. P.	32,93,664	9,11,331	2,23,160	16,114	4,86,083
B. & O.	28,46,666	8,03,771	1,37,112	1,74,682	4,95,585
Bengal	61,76,851	11,95,000	6,54,604	5,78,667	7,99,716
C. P.	13,31,239	4,50,414	95,185	22,878	1,73,012
Bombay	56,01,900	13,51,348	6,45,624	4,63,739	6,69,983
Madras	80,58,386	20,03,582	9,68,201	10,44,941	2,01,861
Coorg	1,09,874	37,607	8,662	10,325	19,572
Assam	8,50,045	3,42,242	93,795*	48,533	1,26,918
Burma	42,69,629	11,34,927	5,31,612	4,43,881	3,50,937
Baluchistan	2,49,494	95,190	9,850	6,511	21,660

* Including compounders.

TABLE G.—ACCOMMODATION IN MENTAL HOSPITALS.

	Number.	Accommodation.			Maximum confined.			Square feet per head.
		M.	F.	Total.	M.	F.	Total.	
British	19	7,351	2,257	9,608	8,108	2,525	10,633	..
Punjab	1	826	182	1,008	925	233	1,158	70
U. P.	3	1,208	406	1,614	1,087	321	1,408	50
B. & O.	2	1,210	372	1,582	1,159	367	1,526	50
C. P.	1	344	126	470	387	105	492	54
Bombay	6	1,273	628	1,901	1,636	748	2,384	50—140
Madras	3	900	254	1,154	1,435	447	1,882	50
Assam	1	566	124	690	569	121	690	50
Burma	2	1,024	165	1,189	910	183	1,093	36—87

TABLE H.—ADMISSIONS, POPULATION, DAILY AVERAGE STRENGTH, DAILY AVERAGE SICK, CURES AND DEATHS AMONGST MENTAL CASES.

	Admitted.	Population.			Cured.	Died.	Average strength.	Average sick.	Criminal insanes.
		M.	F.	Total.					
British India	3,128	10,301	3,028	13,329	1,374	710	10,347·47	712·13	2,596
Punjab	263	1,113	257	1,370	151	40	1,110·13	76·65	235
U. P.	399	1,394	378	1,772	239	96	1,320·16	48·38	398
B. & O.	203	1,271	411	1,682	88	54	1,495·27	73·34	542
C. P.	118	454	124	578	50	30	476·54	20·30	160
Bombay	989	2,209	920	3,129	433	174	2,250·70	101·10	56
Madras	685	1,871	578	2,449	199	130	1,818·69	287·63	279
Assam	172	713	144	857	69	91	673·93	72·22	294
Burma	299	1,276	216	1,492	145	95	1,202·05	32·51	632

TABLE I.—TYPES OF INSANITY TREATED IN MENTAL INSTITUTIONS.

	Punjab.	U. P.	B. & O.	C. P.	Bombay.	Madras.	Assam.	Burma.	Total.
Total	1,370	1,772	1,682	479	3,148	2,437	857	1,492	13,237
Mental Deficiency	113	153	80	51	218	215	8	88	926
Manic Depressive Insanity	168	12	168	51	199	117	132	17	864
Mania	229	333	163	85	681	345	250	396	2,482
Meloncholia	101	237	163	62	677	134	142	262	1,778
Schizophrenia including Dementia Praexox	214	98	345	69	368	724	178	268	2,264
Secondary Dementia	209	32	127	7	243	143	6	54	821
Paranoia and Paranoid States	36	64	164	23	155	96	13	41	592
Epilepsy and Epileptic Insanity	118	131	81	42	91	154	50	40	707
Toxic Psychosis—									
(*a*) Acute Confusional Insanity	36	151	39	6	61	41	1	59	394
(*b*) Alcoholic Psychosis	8	26	30	3	60	79	..	13	219
(*c*) Canabis Indica Psychosis	68	321	107	5	161	139	73	22	896
(*d*) Of Endocrine origin	..	..	..	5	1	7	..	..	13
(*e*) In relation to child bearing	9	61	..	12	59	29	1	8	179
(*f*) In relation to other constitutional diseases	8	24	4	2	49	58	..	1	146
Organic Psychosis—									
(*a*) General	..	2	4	..	11	35	..	112	164
(*b*) Cerebral Syphilis	1	64	11	2	..	18	3	3	102
(*c*) Arteriopathic and Senile Psychosis	24	10	22	26	28	63	..	41	214
(*d*) Encephalitis	8	..	2	..	1	..	..	4	15
(*e*) Other Cerebral Lesions	3	..	4	..	20	4	..	4	35
Neurosis and Psycho-Neurosis	1	14	46	1	13	4	..	3	82
No appreciable disease	16	22	117	26	11	18	..	56	266
Not yet diagnosed	..	17	5	1	41	14	..	..	78

TABLE J.—CAUSES OF INSANITY AMONGST CASES TREATED IN MENTAL HOSPITALS.

	Punjab.	U. P.	B. & O.	C. P.	Bombay.	Madras.	Assam.	Burma.	Total.
Total	333	111	357	238	1,963	1,316	185	299	4,802
Mental Stress—									
Moral	3	2	2	..	97	21	..	..	125
Business worry	13	1	10	31	71	37	6	6	175
Domestic worry	20	2	49	..	272	231	3	22	599
Stress of Military Service	..	..	..	..	6	..	..	..	6
Toxins—									
Cannabis Indica	45	33	6	14	101	55	13	13	280
Alcohol	8	1	12	..	39	40	..	..	100
Other Toxins	..	1	4	..	62	23	..	7	97
Opium	7	..	2	..	3	1	..	40	53
Physical	..	10	1	..	12	110	..	..	133
Bodily illness	14	..	9	5	100	85	4	10	227
Pregnancy	..	..	.	..	8	5	..	..	13
Child-birth	1	2	4	7	28	22	2	2	68
Climacteric	1	1	..	3	12	18	..	1	36
Epilepsy	12	1	19	6	34	62	14	8	156
Head injury	..	..	..	..	7	..	..	1	8
Infection—									
Encephalitis Lethargica	..	..	1	..	2	..	..	..	3
Influenza	..	..	..	..	2	5	..	..	7
Syphilis	2	..	26	..	20	51	2	63	164
Other infections	13	..	..	..	13	18	..	4	48
Old age	3	..	..	1	45	16	..	..	65
Hereditary pre-disposition	21	2	36	36	109	128	10	38	380
Previous attacks	71	5	42	22	80	130	2	18	370
Unascertained	99	50	134	113	840	258	129	66	1,689

TABLE K.—ADMISSIONS BY AGE-GROUPS IN MENTAL HOSPITALS.

	Under 20 years.		20—40 years.		40—60 years.		Over 60 years.		Total.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
British India	157	65	1,787	414	479	161	28	18	2,451	658
Punjab	20	1	173	18	43	5	2	1	238	25
U. P.	16	8	252	46	64	9	4	..	336	63
B. & O.	12	7	91	32	30	23	3	5	136	67
C. P.	5	2	75	16	13	7	..	..	93	25
Bombay	56	23	525	178	129	63	7	8	717	272
Madras	25	18	374	85	124	39	7	3	530	145
Assam	11	2	115	16	18	1	..	..	144	19
Burma	12	4	182	23	58	14	5	1	257	42

TABLE L.—ADMISSIONS BY COMMUNITIES IN MENTAL HOSPITALS.

	Hindus.		Muhammadans.		Christians and Europeans.		Others.		Total.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
British India	1,485	362	581	79	207	156	188	61	2,451	658
Punjab	104	14	123	7	7	4	4	..	238	25
U. P.	259	50	72	9	3	3	2	1	336	63
B. & O.	78	21	29	8	28	36	1	2	136	67
C. P.	76	15	13	2	2	7	2	1	93	25
Bombay	463	141	181	43	55	60	18	28	717	272
Madras	359	98	96	10	70	35	5	2	530	145
Assam	100	18	30	..	7	..	7	1	144	19
Burma	46	5	37	..	35	11	149	26	257	42

TABLE M.—EXPENDITURE ON MENTAL HOSPITALS.

	Total.	Diet.	Bedding and clothing.	Medicines.
	Rs.	Rs.	Rs.	Rs.
British India	36,21,193	9,01,828	1,30,966	18,761
Punjab	4,94,624	1,01,865	21,234	1,816
U. P.	2,35,772	62,803	15,396	882
B. & O.—				
European	3,91,610	74,787	13,751	3,833
Indian	4,83,573	1,59,438	26,664	5,746
C. P.	1,20,325	33,911	6,585	7
Bombay	7,64,370	1,91,056	32,456	3,248
Madras	5,17,021	1,84,456	7,385	2,220
Assam	1,17,268	40,981	5,251	202
Burma	4,96,630	52,531	2,244	807

Appendix IX

relating to

Section X (Prisoners).

TABLE A.—SICKNESS

Statistics by

Administrations.*	Average strength.	Constantly sick.	Cholera. A.	Cholera. D.	Small-pox. A.	Small-pox. D.	Malaria. A.	Malaria. D.
India (excluding Andamans)	143,579	22	0·1	...	0·4	...	137	0·5
	141,895	21	0·2	...	0·4	...	152	0·6
	144,134	*23*	*0·1*	...	*0·4*	...	*168*	*0·5*
Andamans	5,351	45	...	...	...	...	253	1·3
	5,759	27	...	...	...	...	260	1·7
	7,088	*38*	...	...	*0·1*	...	*380*	*7·3*
India (including Andamans)	148,930	23	0·1	...	0·4	...	141	0·5
	147,654	22	0·2	...	0·4	...	157	0·6
	151,222	*23*	*0·1*	...	*0·4*	...	*178*	*0·9*
N.-W. F. P.	6,557	25	...	...	...	...	149	0·5
	6,447	30	...	...	...	...	157	0·9
	6,306	*32*	...	...	*0·2*	...	*218*	*0·6*
Punjab	19,939	21	...	...	0·3	...	193	0·4
	19,957	22	...	...	0·3	...	274	1·4
	20,104	*27*	*0·1*	...	*0·2*	...	*331*	*1·0*
U. P.	31,659	22	0·4	0·1	1·3	0·1	153	0·4
	31,925	19	0·7	0·1	3·8	...	127	0·1
	33,395	*20*	*0·2*	...	*0·6*	...	*148*	*0·3*
B. & O.	10,374	22	...	...	...	...	38	0·8
	10,001	24	0·6	0·1	0·7	...	50	0·6
	10,825	*27*	*0·2*	*0·1*	*0·7*	*0·1*	*98*	*0·4*
Bengal	20,249	38	0·1	...	0·3	...	253	0·9
	19,271	38	0·2	0·1	0·3	...	269	1·2
	16,592	*36*	*0·2*	...	*0·4*	...	*274*	*1·1*
C. P.	4,554	8	...	...	0·4	...	47	0·2
	4,201	11	0·5	0·2	0·7	...	35	0·2
	4,529	*12*	*0·2*	*0·1*	*0·3*	...	*51*	*0·7*
Bombay	11,399	22	...	...	0·2	...	253	0·4
	12,143	22	...	...	...	...	317	0·3
	13,741	*20*	...	...	*0·3*	...	*236*	*0·3*
Madras	12,599	16	...	...	0·1	...	18	0·2
	11,640	15	...	...	0·1	...	18	0·2
	12,678	*19*	...	...	*0·2*	...	*26*	*0·1*
Assam	4,015	23	...	...	...	...	140	1·2
	4,007	22	...	...	...	...	111	0·7
	3,490	*28*	...	...	*0·1*	...	*120*	*0·5*
Burma	20,116	11	0.1	...	...	...	15	0·2
	20,239	10	0·1	...	0·4	...	12	0·2
	20,344	*13*	...	...	*0·4*	...	*34*	*0·4*

A = Admissions.

D = Deaths.

NOTE.—The three figures against each administrative group
The rates have been calculated *per mille*

* Excluding subsidiary jails.

AND MORTALITY.

Administrations.

Tubercle of the lungs.		Pneumonia.		Respiratory diseases.		Dysentery.		Diarrhœa.		Anæmia and debility.		All causes.	
A.	D.	A.	D.	A.	D.	A.	D.	A.	D.	A.	D.	A.	D.
5	2·2	10	2·0	25	0·3	30	0·7	20	0·1	7	0·3	497	11
6	2·2	11	2·8	31	0·5	33	0·8	20	0·2	8	0·3	541	12
7	*1·9*	*12*	*2·6*	*30*	*0·4*	*40*	*0·9*	*21*	*0·2*	*9*	*0·3*	*586*	*12*
3	1·5	3	0·9	24	...	39	0·6	10	...	8	0·6	651	10
4	2·1	4	1·0	28	0·2	26	1·2	6	...	8	1·7	567	11
3	*2·0*	*6*	*2·3*	*22*	*0·4*	*22*	*5·0*	*10*	*0·3*	*10*	*3·4*	*738*	*29*
5	2·1	10	2·0	25	0·3	30	0·7	20	0·1	7	0·3	503	11
6	2·2	11	2·7	30	0·5	33	0·8	19	0·2	8	0·4	552	12
6	*1·9*	*11*	*2·6*	*30*	*0·4*	*39*	*1·1*	*20*	*0·2*	*9*	*0·5*	*593*	*13*
9	3·8	16	2·7	31	0·2	7	...	4	0·2	6	0·2	412	11
10	3·1	33	7·4	59	0·9	13	...	5	...	19	...	496	15
10	*2·9*	*31*	*5·4*	*63*	*0·4*	*14*	*0·2*	*10*	*0·1*	*7*	...	*603*	*14*
9	3·6	8	1·3	32	0·1	12	0·6	12	0·2	5	0·1	582	10
8	3·9	13	3·0	50	0·4	32	0·6	16	0·4	6	0·2	745	15
7	*2·7*	*13*	*3·4*	*48*	*0·6*	*33*	*0·5*	*20*	*0·4*	*13*	*0·2*	*837*	*14*
3	1·1	8	2·0	25	0·6	11	0·2	13	0·1	5	0·1	487	8
3	1·2	7	2·0	25	0·2	15	0·4	15	0·2	6	0·1	459	8
6	*1·2*	*11*	*2·4*	*24*	*0·4*	*22*	*0·4*	*13*	*0·2*	*6*	*0·2*	*494*	*9*
8	4·3	14	2·2	33	0·5	50	1·0	16	...	2	0·2	341	18
9	3·8	14	4·4	29	0·7	45	1·5	19	...	3	0·1	363	20
7	*3·0*	*14*	*3·0*	*37*	*0·5*	*70*	*1·6*	*41*	*0·2*	*2*	*0·1*	*502*	*16*
6	1·3	13	2·7	41	0·3	65	1·0	74	...	18	0·5	1,046	11
6	1·9	11	2·6	41	0·8	66	1·5	63	0·1	30	0·7	1,079	13
5	*1·6*	*12*	*2·3*	*36*	*0·5*	*62*	*1·3*	*57*	*0·2*	*20*	*0·6*	*1,041*	*13*
3	1·5	7	2·2	8	0·2	37	0·7	25	...	7	0·2	224	10
5	1·7	8	2·9	14	1·4	31	0·7	19	1·0	5	1·4	289	15
8	*1·6*	*8*	*2·0*	*15*	*1·1*	*56*	*1·2*	*15*	*0·5*	*4*	*0·7*	*332*	*12*
4	2·0	13	2·0	27	0·1	38	0·9	23	0·2	8	0·4	610	12
3	1·3	17	3·5	40	0·5	51	0·3	32	0·1	7	0·6	737	13
3	*1·1*	*16*	*3·1*	*34*	*0·3*	*54*	*0·3*	*32*	*0·2*	*8*	*0·3*	*639*	*10*
5	1·2	7	1·0	8	0·6	40	0·7	2	0·1	5	0·2	232	11
5	2·0	3	1·1	7	0·8	36	1·3	2	0·3	7	0·6	210	12
10	*1·9*	*4*	*1·1*	*14*	*0·4*	*48*	*1·0*	*2*	*0·1*	*9*	*0·4*	*312*	*10*
10	2·7	26	5·7	40	0·2	96	3·7	15	0·5	25	2·5	496	22
8	1·7	18	5·2	66	0·7	99	1·7	11	...	19	0·5	530	14
10	*3·0*	*14*	*3·8*	*54*	*0·6*	*119*	*2·7*	*23*	*0·2*	*14*	*1·1*	*579*	*17*
5	2·4	5	1·5	5	0·1	8	0·8	3	0·1	3	0·3	146	11
6	2·1	8	1·5	6	0·1	10	0·7	2	0·1	2	0·1	179	10
6	*2·1*	*6*	*1·6*	*9*	*0·2*	*20*	*1·4*	*3*	*0·1*	*5*	*0·5*	*322*	*12*

are those for (1) 1935, (2) 1934 and (3) 1930—34,
of average population.

TABLE B.—*SICKNESS AND MORTALITY FROM PRINCIPAL DISEASES.

Year.	Average annual strength.	Influenza. Actuals. A.	Influenza. Actuals. D.	Influenza. Rates. A.	Influenza. Rates. D.	Cholera. Actuals. A.	Cholera. Actuals. D.	Cholera. Rates. A.	Cholera. Rates. D.	Small-pox. Actuals. A.	Small-pox. Actuals. D.	Small-pox. Rates. A.	Small-pox. Rates. D.	Enteric fever. Actuals. A.	Enteric fever. Actuals. D.	Enteric fever. Rates. A.	Enteric fever. Rates. D.
1935	143,579	3,937	15	27	0·1	18	5	0·1	...	59	3	0·4	...	278	37	2	0·3
1934	141,895	5,667	26	40	0·2	35	7	0·2	...	54	1	0·4	...	243	41	2	0·3
Mean 1930—34	*144,134*	*5,711*	*30*	*40*	*0·2*	*17*	*4*	*0·1*	...	*56*	*3*	*0·4*	...	*327*	*43*	*2*	*0·3*

Year.	Average annual strength.	Malaria. Actuals. A.	Malaria. Actuals. D.	Malaria. Rates. A.	Malaria. Rates. D.	Pyrexia of uncertain origin. Actuals. A.	Pyrexia of uncertain origin. Actuals. D.	Pyrexia of uncertain origin. Rates. A.	Pyrexia of uncertain origin. Rates. D.	Tubercle of the lungs. Actuals. A.	Tubercle of the lungs. Actuals. D.	Tubercle of the lungs. Rates. A.	Tubercle of the lungs. Rates. D.	Pneumonia. Actuals. A.	Pneumonia. Actuals. D.	Pneumonia. Rates. A.	Pneumonia. Rates. D.
1935	143,579	19,683	71	137	0·5	1,000	10	7	0·1	789	310	5	2·2	1,431	292	10	2·0
1934	141,895	21,622	82	152	0·6	1,132	2	8	...	831	308	6	2·2	1,614	392	11	2·8
Mean 1930—34	*144,134*	*24,207*	*79*	*168*	*0·5*	*1,647*	*5*	*11*	...	*938*	*279*	*7*	*1·9*	*1,680*	*370*	*12*	*2·6*

Year.	Average annual strength.	Respiratory diseases. Actuals. A.	Respiratory diseases. Actuals. D.	Respiratory diseases. Rates. A.	Respiratory diseases. Rates. D.	Dysentery. Actuals. A.	Dysentery. Actuals. D.	Dysentery. Rates. A.	Dysentery. Rates. D.	Diarrhœa. Actuals. A.	Diarrhœa. Actuals. D.	Diarrhœa. Rates. A.	Diarrhœa. Rates. D.	Anæmia and Debility. Actuals. A.	Anæmia and Debility. Actuals. D.	Anæmia and Debility. Rates. A.	Anæmia and Debility. Rates. D.
1935	143,579	3,596	46	25	0·3	4,239	100	30	0·7	2,894	14	20	0·1	1,057	43	7	0·3
1934	141,895	4,329	70	31	0·5	4,746	112	33	0·8	2,834	25	20	0·2	1,089	46	8	0·3
Mean 1930—34	*144,134*	*4,364*	*63*	*30*	*0·4*	*5,801*	*125*	*40*	*0·9*	*2,993*	*31*	*21*	*0·2*	*1,282*	*49*	*9*	*0·3*

NOTE.—Rates have been calculated *per mille* of average population. * Excluding Andamans. A=Admissions. D=Deaths.

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ANNUAL REPORT

OF THE

PUBLIC HEALTH COMMISSIONER WITH THE GOVERNMENT OF INDIA

FOR 1935

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VOLUME II.

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ABBREVIATIONS.

A.	Admissions.
A. D. P.	Assistant Director of Pathology.
A. H. Q.	Army Head Quarters.
Av. C. S.	Average constantly sick.
B. M. H.	British Military Hospital.
B. Os.	British Officers.
B. O. Rs.	British Other Ranks.
C.	Cases.
C. M. %	Case mortality per cent.
D.	Deaths.
D. A. D. P.	Deputy Assistant Director of Pathology.
D. A. H.	Disordered Action of the Heart.
G. S. W.	Gun-shot Wounds.
I. O. Rs.	Indian Other Ranks.
M. Os.	Medical Officers.
N. C. Os.	Non-Commissioned Officers.
O. C.	Officer Commanding.
P.	Primary.
P. A.	Per annum.
P. M.	Per mille.
P. U. O.	Pyrexia of uncertain origin.
R.	Revaccinations.
U. K.	United Kingdom.
V. D.	Venereal diseases.
V. D. H.	Valvular diseases of the heart.
%	Per cent.

ANNUAL REPORT OF THE PUBLIC HEALTH COMMISSIONER WITH THE GOVERNMENT OF INDIA FOR 1935.

VOLUME II.

SECTION I.

ON THE HEALTH OF THE BRITISH ARMY IN INDIA.

(From the Director of Medical Services in India.)

1. General health statistics of the British Army in India during the year 1935 are given in the table below :—

TABLE 1.

1935.	Average strength.	Admissions.		Deaths.		"Invalids" sent home.		Invalids discharged from service.		Average constantly sick.	
		No.	Ratio per 1,000.	No.	Ratio per 1,000.	No.	Ratio per 1,000.	No.	Ratio per 1,000.	No.	Ratio per 1,000.
Officers	2,227	1,047	470·1	15	6·74	54	24·25	...	...	37·61	16·89
Other Ranks	52,646	29,853	567·1	134	2·55	363	6·90	...	...	1,407·76	26·74
Numbers of Nursing Service.	...	84	...	...	...	8	...	...	...	3·34	...
Women	4,178	1,305	312·4	14	3·35	39	9·33	...	...	41·07	9·83
Women confinement	...	904	...	1	...	...	...	...	...	34·11	...
Children	6,522	2,180	334·3	63	9·66	14	2·15	...	...	62·29	9·55
Royal Navy and R. A. F.	...	1,258*	...	63	...	75	...	...	...	43·59*	...
R. A. F. Women and Children.	...	57	...	...	...	...	...	...	...	2·19	...
R. A. F. Women confinement.	...	10	...	...	...	...	...	...	...	0·40	...
Royal Indian Marine	...	5	...	...	...	...	...	...	...	0·40	..
Boys of Sanawar L. R. M. School.	...	580	...	...	...	...	...	...	...	7·58	...
Others :											
Men	...	479	...	21	...	...	...	...	...	5·94	...
Women	...	329	...	8	...	25	...	...	...	9·10	...
Women confinement.	...	129	...	...	...	...	...	...	...	4·74	...
Children	...	184	...	7	...	3	...	...	...	5·32	...

* Includes 402 and 11·72 respectively for R. A. F. cases treated in quarters.

The ratios per 1,000 for admissions, deaths and invalids, amongst officers and other ranks for the quinquennial periods 1910-14, 1920-24, 1925-29 and 1930-34 with that for 1935 are given separately for purposes of comparison in the following table :—

TABLE 2.

Periods.	Ratio per 1,000.					
	Admissions.		Deaths.		Invalids.	
	Officers.	Other Ranks.	Officers.	Other Ranks.	Officers.	Other Ranks.
1910—14	567·5	567·2	5·14	4·36	16·30	7·03
1920—24	676·7	791·9	6·71	5·24	20·99	18·91
1925—29	589·9	619·4	5·25	2·90	17·44	13·50
1930—34	428·6	604·7	6·69	2·64	20·09	8·88
1935	**470·1**	**567·1**	**6·74**	**2·55**	**24·25**	**6·90**

Officers.

2. 470·1 per 1,000 of strength were admitted to hospital during the year, compared with 429·2 in 1934.

The principal causes of sickness were :—

Malaria	79	Wounds (other than G. S. W.)	24
Jaundice	78	Contusion	23
Cellulitis	65	Concussions	22
Dysentery	64	Sprain and strain	19
Sandfly fever	60	Pharyngitis	19
Tonsillitis	51	Gastritis	16
Diarrhœa	44	Appendicitis	14
Fractures	43	Common cold	11
Influenza	30		

There were 15 deaths giving a ratio of 6·74 per 1,000 compared with 16 and 6·83 per 1,000 in 1934.

The causes of death were injuries (other than G. S. W.) 9 cases, G. S. wound, typhoid fever, dysentery, embolism coronary artery, obstruction of the intestines and nephritis interstitial each one case.

The average constantly sick in hospital was 37·61 or 16·89 per 1,000 of strength as compared with 34·05 or 14·50 in the previous year.

1,216 or 546·0 per 1,000 of the strength were treated as outpatients.

Soldiers.

3. 29,853 or 567·1 per 1,000 of the strength were admitted to hospital, compared with 574·1 in 1934 and 580·5 in 1913.

The principal causes of admission to hospital showing the increase or decrease compared with the previous year were :—

	1935.	Increase or decrease.		1935.	Increase or decrease.
Malaria	2,955	— 721	Boils	473	+ 21
Cellulitis	2,301	— 34	Appendicitis	423	— 52
Sandfly fever	1,922	— 51	Pharyngitis	420	— 21
Dysentery	1,536	+ 147	Impetigo contagiosa	371	+ 1
Tonsillitis	1,494	— 202	Soft chancre	357	+136
Gonorrhœa	1,357	— 13	Jaundice	353	— 44
Sprain	907	— 91	Common cold	342	+167
Bronchitis	757	— 13	Constipation	332	— 14
Diarrhœa	734	— 77	Syphilis	315	+ 71
Fractures	710	+ 52	Gastritis	307	— 35
Contusion	607	— 219	Wounds	303	— 60
Synovitis	578	+ 50	Dengue	262	— 98
Influenza	560	— 337			

18 Diphtheria "Carriers" were admitted to hospital.

There were 134 deaths or 2·55 per 1,000 of the strength compared with 121 or 2·22 per 1,000 in 1934.

The most important causes of mortality were :—

Local injuries	32
Pneumonia	19
General injuries	21
Enteric group of fevers	9

363 or 6·90 per 1,000 of the strength were sent home as invalids, compared with 511 or 9·39 per 1,000 in 1934.

The principal causes of invaliding to the United Kingdom were :—

	1935.	Increase or Decrease.		1935.	Increase or Decrease.
Pulmonary tuberculosis	35	—16	Epilepsy	13	—13
Mental diseases, other than schizophrenia and neurasthenia.	30	— 9	Deformities of limbs	13	—11
			Valvular disease of the heart	10	— 3
Injuries, other than fractures	21	+ 4	Diseases of bronchi and bronchioles	10	— 3
Diseases of joints	21	— 3	Fractures	9	—11
Schizophrenia	20	..	Tuberculosis, other than pulmonary	9	— 1
Diseases of urinary organs	17	+ 1			
Otitis media	14	..	Duodenal ulcer	8	—18

The average number constantly sick in hospital was 1,407·76 or 26·74 per 1,000 of the strength, compared with 1,411·13 or 25·93 per 1,000 in 1934.

The diseases chiefly responsible were :—

	Average Constantly Sick.		Average Constantly Sick.
Gonorrhœa	175·57	Soft chancre	36·33
Malaria	107·66	Sprain and strain	29·58
Cellulitis	78·99	Appendicitis	29·08
Dysentery	67·16	Syphilis	27·34
Fractures	49·69	Bronchitis	26·04
Sandfly fever	39·53	Synovitis	24·53
Tonsillitis	37·45	Contusions	20·04

83,234 men, or 1,581·0 per 1,000 of the strength were treated as out-patients, with an average daily number under treatment of 1,088·76 or 20·68 per 1,000.

The combined ratio constantly sick in hospital and under treatment as out-patients was 47·42 per 1,000 of the strength, compared with 49·19 in 1934.

The actual loss to the Army in India in working days was 513,832 due to sick in hospital and 397,397 due to sick in barracks, making a total of 911,229 days compared with 977,196 in 1934.

The admission and death ratios per 1,000 of the strength for all causes and certain important diseases for stations with a strength of 1,000 and upwards compared with all India, are shown in the following tables :—

TABLE 3.

Table showing admission and death ratios per 1,000 of the strength for all causes and certain important diseases for stations with a strength of 1,000 and upwards compared with all-India.

		Stations with total admission ratios higher than all-India.						
		Peshawar.	Lahore.	Nowshera.	Quetta.	Meerut.	Mhow.	All-India.
Strength.		1,248	1,174	1,297	2,386	1,715	1,475	52,646
All Causes.	A.	954·3	712·9	652·3	594·7	583·7	581·0	567·1
	D.	4·01	2·56	3·86	4·61	1·17	2·03	2·55
	Av. C. S.	39·18	42·90	27·89	22·83	30·94	28·02	26·74
Malaria	A.	132·2	69·8	69·4	171·8	84·5	83·4	56·1
	D.	...	...	...	0·84	...	...	0·08
Sandfly fever	A.	291·7	26·4	144·9	2·1	11·1	0·7	36·5
	D.	...	...	...	...	...	...	...
Enteric group of fevers	A.	5·6	6·8	1·5	1·3	1·7	...	2·0
	D.	...	...	...	...	...	...	0·17
Dysentery	A.	70·5	43·4	16·2	40·7	39·1	19·7	29·2
	D.	...	...	...	...	...	...	0·02
Diarrhœa	A.	24·0	17·0	6·2	7·1	13·4	19·7	13·9
	D.	...	...	...	...	...	...	...
Influenza	A.	1·6	5·1	1·5	17·2	19·8	29·8	10·6
	D	...	...	...	...	...	...	...
Pneumonia (Lobar and Lobular)	A.	7·2	8·5	13·9	4·2	8·2	6·8	4·2
	D.	0·80	1·70	0·77	0·42	1·17	...	0·40
Venereal diseases	A.	28·8	71·6	15·4	15·1	26·8	22·4	38·8
	D.	...	...	...	...	...	...	0·04
Minor septic diseases	A.	75·3	60·5	53·2	56·6	42·6	54·9	59·7
	D.	...	...	...	...	...	...	...
Local injuries	A.	72·1	56·2	73·2	49·5	54·8	64·4	62·2
	D.	2·40	...	0·77	0·84	...	1·36	0·61
Heat-stroke	A.	...	1·7	0·8	...	...	...	0·2
	D.	...	0·85	0·77	...	...	...	0·08
Heat exhaustion.	A.	1·6	9·4	...	...	2·3	...	1·5
	D.	...	...	...	...	...	...	0·08

A.—Admissions.
D.—Deaths.
Av. C. S.—Average constantly sick.

TABLE 3—*contd.*

Table showing admission and death ratios per 1,000 of the strength for all causes and certain important diseases for stations with a strength of 1,000 and upwards compared with all-India.

		Stations with total admission ratios lower than all-India.										
		Bangalore.	Lucknow.	Jubbulpore.	Sialkot.	Poona.	Rawalpindi.	Razmak.	Secunderabad.	Karachi.	Ranikhet.	All-India.
Strength.		1,047	2,288	1,358	1,306	2,327	2,525	1,062	2,676	1,123	1,108	52,646
All Causes	A.	554·0	534·1	533·1	518·4	510·5	499·4	499·1	494·4	423·9	422·4	567·1
	D.	3·82	4·37	0·74	2·30	1·72	1·58	...	0·75	...	3·61	2·55
	Av. C. S.	26·10	25·42	26·35	21·47	34·87	25·83	25·14	21·46	30·11	29·23	26·74
Malaria	A.	11·5	24·0	47·9	20·7	80·4	57·4	60·3	6·7	37·4	10·8	53·1
	D.	...	...	...	...	...	...	...	...	...	...	0·08
Sandfly fever	A.	...	7·0	6·6	47·5	...	57·4	1·9	19·8	17·8	10·8	36·5
	D.	...	...	...	...	...	...	...	...	...	...	...
Enteric group of fevers	A.	...	0·4	1·5	1·5	0·9	0·8	...	1·5	1·8	...	2·0
	D.	...	...	...	...	...	...	...	0·37	...	...	0·17
Dysentery	A.	34·4	16·6	26·5	19·9	32·2	21·8	5·6	35·5	34·7	55·1	29·2
	D.	...	...	...	...	...	...	...	...	...	...	0·02
Diarrhœa.	A.	2·9	20·5	19·9	13·0	7·7	9·1	11·3	20·2	3·6	21·7	13·9
	D.	...	...	...	...	...	...	...	...	...	...	...
Influenza	A.	3·8	11·4	0·7	0·8	6·9	19·0	3·8	37·7	...	0·9	10·6
	D.	...	...	...	...	...	...	...	...	...	...	...
Pneumonia (Lobar and Lobular).	A.	3·8	4·4	4·4	2·3	3·0	4·4	2·8	4·1	0·9	4·5	4·2
	D.	...	0·44	...	...	...	...	...	...	...	0·90	0·40
Venereal diseases.	A.	79·3	58·6	36·1	19·9	25·4	17·8	12·2	19·8	22·3	9·0	38·8
	D.	...	...	...	...	...	...	...	...	...	...	0·04
Minor septic diseases	A.	109·8	53·1	75·1	48·2	41·7	45·9	71·6	44·5	34·7	22·6	59·7
	D.	...	...	...	...	...	...	...	...	...	...	...
Local injuries	A.	68·8	77·4	61·9	74·3	73·9	44·0	50·8	54·2	49·0	60·5	62·2
	D.	0·96	1·75	0·74	...	0·43	0·79	...	0·37	...	...	0·61
Heat-stroke	A.	...	...	0·7	0·8	...	...	...	...	...	...	0·2
	D.	...	0·44	...	...	...	...	...	...	...	...	0·08
Heat exhaustion.	A.	...	0·4	1·5	6·1	...	...	...	...	...	...	1·5
	D.	...	0·44	...	...	...	...	...	...	...	...	0·08

A.—Admissions.
D.—Deaths.
Av. C. S.—Average constantly sick.

Women and Children (B. O. Rs.).

4. 1,305 women or 312·4 per 1,000 of the strength were admitted to hospital, compared with 1,396 or 311·6 per 1,000 in 1934.

The principal causes of admission to hospital were :—

Abortion	114	Appendicitis	41
Malaria	99	Constipation	40
Dysentery	60	Cellulitis	38
Tonsillitis	56	Gastritis	33
Diarrhœa	44	Bronchitis	31

In addition, 904 women were admitted to hospital for parturition.

2,936 or 702·7 per 1,000 of the strength were treated as out-patients.

2,180 children or 334·3 per 1,000 of the strength were admitted to hospital compared with 2,077 or 299·6 in 1934.

The principal causes of admission to hospital were :—

Tonsillitis (including inflammation and hypertrophy)	357	Constipation	57
Dysentery	169	Measles	56
Bronchitis	148	Taenia saginata	38
Diarrhœa	136	Fractures	37
Malaria	103	Caries teeth	35
Cellulitis	68	Rubella	33
Enteritis	66	Jaundice	32

There were 63 deaths giving a ratio of 9·66 per 1,000. The chief causes were :—

Enteritis	16	Convulsions	4
Inanition	8	Premature birth	4
Dysentery	5		

4,914 or 753·4 per 1,000 of the strength were treated as out-patients.

PRINCIPAL DISEASES AFFECTING THE BRITISH ARMY.

Cerebro-spinal fever.

5. One British Officer at Rawalpindi and one British Other Rank at Peshawar contracted the disease and both recovered.

Table No. 4 shows the incidence of the disease in the Army in India during the last five years and it will be seen that there has been a further decrease both in the number of cases and in the case mortality among Indian Other Ranks.

TABLE No. 4.

Incidence, Death and case mortality in Cerebrospinal meningitis.

	1931.			1932.			1933.			1934.			1935.		
	A.	D.	C.M. %	A.	D.	C.M. %	A.	D.	C.M. %	A.	D.	C.M. %	A.	D.	C.M. %
B. O. Rs.	2	2	100	8	6	75	3	2	67	2	1	50	1	...	...
I. O. Rs.	15	9	60	9	9	100	24	16	67	38	15	40	19	7	37
B. Os.	...	...	...	...	...	...	1	1	100	...	...	...	1	...	...
Others	...	...	...	...	...	...	1	1	100	12	4	33	20*	9	45
Total	17	11	65	17	15	88	29	20	69	52	20	39	41	16	93

C. M. % = Case Mortality per cent.

* Includes—Territorial 6, Mily. School boys 4, Followers 9, Navy 1

Out of the total of 41 cases there were 21 in Northern Command, 10 in Eastern Command, 7 in Southern Command and 3 in Western Command.

The majority of cases occurred in the first three months of the year.

Triple concentrated serum was used as in 1934 and the average amount injected in each case was 105 c.c. intrathecally and 50 c.c. intravenously or intramuscularly.

In three cases iodine was given intravenously as well as serum and all three cases recovered. In two other cases Trypaflavine was given intravenously in addition to serum ; one case recovered and the other died.

Cysticercosis.

6. There were 5 cases during the year (Razmak 2, Ahmednagar 1, Poona 1, Wellington 1) of which 4 were invalided. Special attention is still being paid to the control of piggeries and the sale of pig products, and also to the prevention of infestation from carriers. In spite of all precautions there were 24 cases of infestation with T. Solium during the year, the same number as in 1934. Of these 24 cases this year 7 occurred in Northern Command, 12 in Eastern Command and 5 in Burma. Thirteen cases of epilepsy were invalided during the year but none of these was associated with cysticercosis.

Dracontiasis.

7. There were 9 admissions during the year but of these there were only 5 actual cases, the other 4 being readmissions. Four of the cases occurred at Mhow and the fifth at Ahmednagar.

Dengue, Sandfly fever, Fevers of the Typhus Group, and P. U. O.

8. Table No. 5 shows the incidence of these diseases during the last four years :—

TABLE No. 5.

	1932.		1933.		1934.		1935.	
	Admns.	Ratio per 1,000.	Admns.	Ratio per 1,000.	Admns.	Ratio per 1,000.	Admns.	Ratio per 1,000.
Dengue . .	432	7·8	644	11·7	360	6·6	262	5·0
Sandfly fever .	2,262	40·9	2,252	40·9	1,973	36·2	1,922	36·5
Fevers of the Typhus Group	11	0·2	23	0·4	52	1·0	19	0·4
P. U. O. . .	106	1·9	61	1·1	46	0·8	37	0·7

Dengue.

The incidence of this disease in 1935 is the lowest in 11 years.

The stations with the highest incidence were :—

Stations.	Actuals.	Ratio per 1,000.
Mingaladon	84	108·11
Madras	44	55·28
Calcutta	41	45·51
Bangalore	28	26·74
Bombay	15	6·83

It will be seen that the three coastal stations as usual produced the greater number of cases. At Karachi there were no cases either among British or Indian troops and this is interesting in view of the importance now being placed on the prevention of yellow fever gaining admittance from Africa to India through the Karachi Airport.

The great majority of the cases do not show the typical signs or symptoms such as the initial and terminal rashes or the secondary rise of temperature, and this diagnosis therefore remains, as in former years, to a considerable extent an inexact one.

Sandfly fever.

Research into the epidemiology of sandfly fever were continued at Peshawar. Further attempts to infect mice with material from human cases and produce a fixed virus were however uniformly unsuccessful.

The incidence of this disease and its distribution shows little change. Peshawar District still produces the greatest number of cases, Landikotal being the station most affected.

As in the case of Dengue the correctness of the diagnosis of this disease except possibly in the northern areas, is frequently a matter of uncertainty. For example during the past few years there had been an unaccountable increase in the number of cases in certain stations ; attention was directed to this and since then the incidence of the disease appeared to have lessened in these stations although local conditions remained the same. In view of the fact that many undoubted cases of sandfly fever do not exhibit classical clinical features the difficulties of clinicians in this respect must be realised. During 1935 an unaccountable rise occurred in three other stations in Eastern Command.

Until some preventive method can be discovered against this disease, the policy of replacing and repairing unsuitable buildings is being continued. The following note from Northern Command sums up the situation in that area.

" It is very noticeable, both with barracks and bungalows, that in old buildings, particularly with mud walls, the majority of occupants invariably succumb, whereas in new buildings and well-repaired buildings the occupants remain free, provided rubble heaps and other breeding places are eliminated from the immediate vicinity. Unless we obtain some prophylactic preventive method, it seems very unlikely that we can expect any real reduction in this disease as long as the present conditions of housing continue."

Fevers of the Typhus Group.

Eighty two cases occurred among British and Indian troops, of which only 19 were among British troops as compared with 52 in 1934.

The results of agglutination tests against standardised " O " suspensions of B. proteus XK, X2, and X19, as in 1934, fall into three serological groups corresponding to each of the above antigens (XK=18 cases, X2=14 cases, X19=43 cases). Seven cases owing to a general rise in titre, too small a rise in titre or insufficient tests could not be grouped.

Forty-five cases occurred in Southern Command, twenty in Northern Command. Five (X19) in Western Command, eight in Eastern Command, and four (XK) in Burma.

The seasonal incidence in all groups was mainly in the post-monsoon and cooler months. In Southern Command the seasonal distribution covered rather a wider period probably due to the greater humidity, and less extremes of temperature which occur in this command.

Symptoms in each group varied from very severe to very mild. On the whole the 18 cases of the XK group were the most severe. A greater proportion suffered from nervous symptoms, *e.g.*, lassitude, drowsiness, indifference to surroundings, etc. On the other hand 4 cases (22 per cent.) complained of no symptoms, except pyrexia of very moderate degree and duration and slight initial headache. Throat symptoms were a marked feature in several cases. Rash was present in 22 per cent only (erythema, or erythema *plus* macules) and in all cases was restricted to the trunk.

Six of these cases occurred as part of a small epidemic in the early autumn in the Simla Hills, which included some civil as well as military cases. This period corresponds with the height of the "Flea" season and Lt.-Colonel G. Covell, I.M.S., discovered and passaged a strain of Rickettsia from fleas caught in this area but this proved to be in antigenic structure OX19. Co-agglutinins to OX19 and OX2 were mainly absent or present only in low titres. In 3 cases, 10 per cent, (1 OX2, 1 OX19, 1 OX2 and OX19) co-agglutinins were present in appreciable titres.

In only one case (officer) was there any history of insect bites. The flea was suspected by the patient as vector but the history was not absolutely definite.

Cases of the OX2 serological group occurred mainly in Southern but also in Northern and Eastern Commands, seasonal distribution being very similar to that of the OXK group. Symptoms in this group were similar and come next in order of severity to the OXK cases, mental disturbance, drowsiness, etc., being however less frequent than in the former. In 6 cases (42 per cent.), no symptoms were present except headache and moderate pyrexia.

Maculo papular rash involving the extremities as well as the trunk was present in 85·7 per cent. of the cases, and in the majority (contrary to the other two groups), there was in many cases a history of association with camps, flag marches, training, etc., but, as was the case with the other groups, no history of tick or other insect bites.

Co-agglutinins to OX19, OXK, or both occurred in practically all cases, but insufficiently so in the vast majority to create any doubt as to correctness of the grouping on serological grounds.

Cases of the OX19 serological group occurred as in 1934 to a large extent in Southern Command (50 per cent.). Twelve cases were discovered in Northern Command of which seven were from Rawalpindi, four in Western and three in Eastern Command. Seasonal distribution was similar to those of the other groups. Symptoms were definitely milder than in either the OXK, or OX2 group, being on the whole more severe among the few British cases. In only a few cases are nervous symptoms such as drowsiness, lassitude, etc., mentioned. Complications such as broncho-pneumonia did occur, and one case developed acute nephritis. Rashes variously described as erythema, subcuticular mottling, maculo roseolar, in two cases pigmented in the later stages, were seen in 70 per cent. of the British cases, but in only 18 per cent. of the Indian. In the former both trunk and extremities were involved. In the latter rash on trunk only was noted. It is probable that the dark skin of the Indian troops renders the record of a mild rash of doubtful accuracy, in that it may depend to a considerable extent on the interest taken

in its discovery. One case (British) is interesting in that symptoms occurred 5 days after landing in India from the U. K. In 72 per cent symptoms other than headache, and pyrexia of moderate duration were absent.

Co-agglutinins to OXK, and OX2 were present in the great majority but on the whole the serological result are clear cut, and very high titres were reached in some of the cases.

As in 1934 a marked rise in agglutinins to Enteric group H agglutinins was found to occur, most marked in the OXK group but close on 30 per cent. of the total cases in the three groups would have been included among the Enteric group of fevers had not tests been simultaneously carried out against the Proteus group. T. O. agglutinins although not affected to the same extent, show a definite rise in a certain number of cases, approximately 7-10 per cent.

In this connection it may be mentioned that a certain amount of caution seems necessary in connection with the differential diagnosis of this group of fevers. It will be noted that 22 per cent. of the OXK group, 42 per cent. of the OX2 group and 72 per cent. of the OX19 group, appear to have suffered only from slight initial headache and pyrexia, varying from 6 to 22 days, onset being either sudden with rigors, or gradual with " chilly feelings ", with slight morning remissions, falling usually by lysis, and very occasionally by crisis. A slow pulse in proportion to the temperature was present but few or no other signs or symptoms were observed. Such a sequence of events will be found in a considerable proportion of proved typhoid cases among the inoculated population of the army in India. It is considered that in no small proportion of the cases therefore the diagnosis is at the moment purely a laboratory diagnosis. Before this can always be accepted as final it must be very certain that Enteric group infections have no influence on Proteus OX agglutinins in the serum of individuals who may have suffered from previous infections of the typhus group. Such individuals must be at least fairly common in India. A certain amount of evidence has been collected which indicates that the effect of the Enteric group infections is by no means always negligible. It is considered therefore that for the time being, particularly in regard to the mild rashless cases, it is unwise to cease laboratory investigations for the Enteric group of bacilli, except in the face of very definite clinical evidence or the appearance of really high titres of agglutination to the proteus group. Further investigations in connection with this problem are proceeding.

Pyrexia of Uncertain Origin.

There were 37 cases during the year and the steady decrease in the last three years of cases classified under this heading has been maintained. Poona had the greatest number of cases and the hill stations Murree, Kuldana, and Barian in Rawalpindi District took second place.

Many of the cases diagnosed Sandfly fever and Dengue, especially in stations where these diseases are not endemic, might more correctly be classified as Pyrexia of Uncertain Origin.

Diphtheria.

9. Table No. 6 shows the incidence of diphtheria among British troops in 1935.

TABLE No. 6.

Stations.	Number of cases.	Stations.	Number of cases.
	33	Nowshera	1
Rawalpindi	6	Peshawar	1
Mhow	5	Roorkee	1
Meerut			
	3	Agra	1
Kamptee	3	Barrackpore	1
Bareilly	2	Jubbulpore	1
Lahore			
	2	Bangalore	1
Razmak	2	Maymyo	1
Delhi	2		
Calcutta			

There was an outbreak of cutaneous and faucial diphtheria in a battalion engaged in operations on the N. W. Frontier in the autumn of 1935 and this outbreak presented many interesting points.

A detailed report by Major Bensted, R.A.M.C., D.A.D.P., Rawalpindi District is to be published in the R.A.M.C. Journal and the following notes are extracted from his report. Although the epidemic extended in the early months of 1936, for the sake of continuity it is here dealt with as a whole.

The troops were operating over rocky ground and there were few who did not suffer from abrasions which at the time appeared trivial. In one battalion these abrasions not only did not heal but also became progressively worse under the ordinary treatment, thus giving rise to the impression that they were the "frontier" sores frequently seen in the area. These frontier sores are usually staphylococcal and not to be confused with cutaneous Leishmaniasis.

In November 1935, when the force was returning from the operations, two cases of faucial diphtheria occurred in the battalion while on the line of March. Bacteriological examination of the sores of men in hospital from the same unit then revealed eight cases of cutaneous diphtheria; these men had all suffered from abrasions in the same area of operations. Repeated throat swabs from the cutaneous cases were negative for C. diphtheriae.

Extensive investigations were then carried out among all the troops operating in the same area with the result that 31 men of the infected battalion were found to be harbouring C. diphtheriae whereas none were found in any other units. Moreover, although men from other units were suffering from sores, it was only in the infected battalion that C. diphtheriae were isolated from the sores. Actually one case did occur in a man from another unit but subsequently this was proved to be a cross infection in hospital.

The discovery of cases of cutaneous diphtheria and virulent throat carriers continued for sometime and then in December 1935 cases of typical faucial diphtheria began to occur and continued inspite of isolation of cases and carriers. Schick testing material was then obtained by air mail from England and the whole battalion was tested. Twenty-seven per cent were found to be non-immune and were immunised but before immunity was established 4 more cases of faucial and 2 of cutaneous diphtheria developed. It was not until immunity was established that the outbreak eventually came to an end.

The cases and carriers which occurred during the whole period of the epidemic were :—

	1935.			1936.		
	Oct.	Nov.	Dec.	Jan.	Feb.	Total.
Carriers . .	1	9	14	6	1	31
Faucial . .	..	3	5	6	..	14
Cutaneous . .	..	2	7	6	..	15

Seventy-three different strains of diphtheria-like bacilli were isolated in all, 61 of them virulent C. diphtheriae mitis, 31 being from cutaneous cases, 15 from faucial and 15 from healthy throats.

For the treatment of cutaneous cases diphtheria antitoxin was injected intramuscularly and also applied locally as a dressing. The initial intramuscular injection was 8,000 to 16,000 units and the average amount injected in each case was 30,000 units. In most cases the ulcers were healing by the fourth day and diphtheria bacilli could no longer be obtained. In some cases however C. diphtheria persisted for a long time inspite of a healthy granulating surface and prolonged serum treatment. In these cases the best results were obtained by applying mucidan as a dressing.

Enteric group of Fevers

10. The incidence of enteric fevers among British and Indian troops during the years 1933, 1934, and 1935 is shown in Table No. 7.

TABLE No. 7.

British.

	1933.				1934.				1935.			
	Actuals.		Ratio per 1,000.		Actuals.		Ratio per 1,000.		Actuals.		Ratio per 1,000.	
	A.	D.	A.	D.	A.	D.	A.	D.	A.	D.	A.	D.
Typhoid .	56	11	1·0	0·20	27	5	0·5	0·09	27	8	0·5	0·15
Para. A .	14	...	0·3	...	8	...	0·1	...	13	...	0·2	...
Para. B .	1	..	0·02	...	...	...	...	...	...	...	...	...
Para. C .	...	...	...	...	1	...	0·02	...	...	...	...	...
Enteric group	102	3	1·9	0·05	55	2	1·01	0·04	66	1	1·3	0·02
Total .	173	14	3·1	0·25	91	7	1·7	0·13	106	9	2·0	0·17

Indian.

	1933.				1934.				1935.			
	Actuals.		Ratio per 1,000.		Actuals.		Ratio per 1,000.		Actuals.		Ratio per 1,000.	
	A.	D.	A.	D.	A.	D.	A.	D.	A.	D.	A.	D.
Typhoid .	81	15	0·7	0·13	78	11	0·66	0·09	55	8	0·5	0·07
Para. A .	38	1	0·3	0·01	45	...	0·38	...	46	3	0·4	0·03
Para. B .	2	...	0·02	...	4	...	0·03	...	1	...	0·01	0
Para. C .	3	...	0·03	...	2	...	0·02	...	...	...	...	...
Enteric group.	120	7	1·0	0·06	93	4	0·8	0·03	62	2	0·5	0·02
Total .	244	23	2·1	0·20	222	15	1·9	0·13	164	13	1·4	0·1

The incidence among British troops has increased slightly (0·3 per 1,000) as compared with 1934. The incidence in 1934 was however the lowest ever

recorded, and the admission ratio in 1935 is the second lowest during a period of 64 years. The death rate in 1935 also rose slightly (0·04 per 1,000) as compared with 1934. The numbers of bacteriologically proven typhoid cases were the same in 1934 (27), half as many as occurred in 1933, and one third of those which occurred in 1932.

In contrast to the British troops the progressive, although less dramatic, fall in incidence among Indian troops since 1932 has continued, there being 58 fewer cases of enteric group of fevers than in 1934, and 23 fever cases of bacteriologically proven typhoid fever. As regards the fall in the enteric group cases it should be noted that a considerable percentage of cases now diagnosed as belonging to the typhus group would three years ago have been included among the enteric group. In fact it is difficult to assign any comparative value to annual statistics for Indian troops in this connection owing to the greater accuracy in diagnosis, and improved bacteriological investigation, which has been progressive for the last ten years. The average admission ratio per 1,000 during the years 1930-1935 (1·87) is actually greater than during the years 1910-1914 (1·8), *i.e.*, before T. A. B. inoculation was introduced for Indian troops, when very large numbers of cases were included under such diagnostic headings as simple continued fever, remittent fever, P. U. O. etc., now discarded. During the years 1920-1925 there were 148 Indian cases of Typhoid bacteriologically diagnosed, whereas during 1930—1935 there were 549 cases. Statistics for British troops are more reliable, though open to the same error in a less degree. There were 1,149 cases of the enteric group fevers admitted to hospital in 1920—1925, and 948 in 1930—1935. Improvement in laboratory diagnosis is shown by the fact that inspite of the drop in numbers, the number of bacteriologically proven typhoid fevers is the same for the two periods, 312 as compared with 310. It is satisfactory to record that the number of deaths dropped from 107 to 69 in the latter period.

In 1935 there were 9 deaths among the British, and 13 deaths among the Indian cases. A striking feature of these cases is that in 19 out of 22 deaths occurred before the end of the 2nd week, suggesting either an overwhelming infection, or an ambulant type of the disease. Perforation of the intestine occurred in 3 cases, (8th, 11th, 12th day), haemorrhage in 2 cases (9th and 10th day), seven cases died of intense toxaemia on 6th, 8th, 10th (2), 11th 12th, 14th day after admission to hospital. The remaining deaths were due to lung complications, broncho-pneumonia, lobar pneumonia, empyema, etc. The great majority, particularly among Indian troops had been repeatedly inoculated during their service, one case who had been inoculated on 7 occasions, dying of a perforation on the 11th day.

In the annual report of 1933 attention was directed to the fact that the admission ratio, case mortality and death ratio, for bacteriologically proven typhoid cases in British troops were high in the case of men under 1 year's service in India when compared with those of over one year's service.

The average of the years 1929—1933 in these respects is reproduced in Table No. 8, and corresponding figures are given for the years 1934 and 1935. It will be noted that in the latter two years both the admission and death ratios in the group under 1 year in India have fallen markedly as compared with the group of over 1 year in India. It seems reasonable to conclude that the fall is due to the improvement in the T. A. B. vaccine manufactured at the R. A. M. College since the year 1933. The case mortality rate is however disappointingly high during 1934 and 1935, and mainly due to the type of case noted above.

TABLE No. 8.

Typhoid Fever in British Troops (B. O. Rs. only).

	Under 1 year in India.						Over 1 year in India.					
	Strength.	Cases.		Deaths.		Case mortality %.	Strength.	Cases.		Deaths.		Case mortality %.
		Actuals.	Ratio per 1,000.	Actuals.	Ratio per 1,000.			Actuals.	Ratio per 1,000.	Actuals.	Ratio per 1,000.	
Average for 5 years 1929—												
1933 . .	10,632	30	2·84	7	0·68	23·84	44,814	32	0·71	4	0·08	11
1934 . .	10,988	7	0·64	2	0·18	28·57	43,441	20	0·46	3	0·07	15
1935 . .	*10,830*	*7*	*0·65*	*2*	*0·18*	*28·57*	*41,816*	*20*	*0·48*	*6*	*0·14*	*30*
Average for 2 years 1934—												
1935 . .	10,909	7	0·65	2	0·18	28·57	42,628	20	0·47	4	0·11	22

Proportionate admission ratios, case mortality and death ratios for the two groups of cases, and for the periods 1929—1933, and 1934—1935 are given in Table No. 9.

TABLE No. 9.

	1929—1933.		1934-1935.	
	Over 1 year.	Under 1 year.	Over 1 year.	Under 1 year.
Admission ratio	1	4·0	1	1·4
Case mortality	1	2·1	1	1·3
Death ratio	1	8·6	1	1·6

For several years before and including 1928, it was the custom to re-inoculate all troops with 1 c.c. T. A. B. vaccine. Owing to the fact that as high a proportion as 50 per cent. of the cases occurred annually within 6 months of inoculation the two dose system 1/2 and 1 c.c. at 18 monthly periods was introduced from 1929. The results obtained since this year among British troops are given in Table No. 10. It is of interest that the percentage of cases falling within the first six monthly period after inoculation has remained almost constant during a period of 7 years at just above 30 per cent, which still appears unduly high. Nearly every year the highest percentage lies between the six and twelve monthly period and the lowest percentage in the twelve to eighteen monthly period, when it might be expected that protection was beginning to fail. No figures are available from which the actual numbers of the population at risk in each post-inoculation period can be calculated, but after so many years it is considered probable that the numbers would have fallen into three approximately equal groups and the percentages in each group are sufficiently approximate during this series of years to suggest that they are of some significance.

TABLE No. 10.

	Total Enteric group of fevers (British).			Typhoid cases (British) bacteriologically proven.		
	0—6 months.	6—12 months.	12—18 months.	0—6 months.	6—12 months.	12—18 months.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
1929 . .	32·2	50·5	17·5	31·2	58·3	10·4
1930 . .	37·6	43·6	18·8	32·7	46·6	20·7
1931 . .	35·4	35·4	29·2	34·4	34·9	30·2
1932 . .	33·7	38·0	28·2	30·9	45·4	23·6
1933 . .	32·0	44·0	24·0	25·0	45·8	29·2
1934 . .	33·7	35·1	31·1	40·0	24·0	36·0
1935 . .	**30·0**	**43·3**	**26·6**	**21·7**	**43·4**	**34·7**
Average 1929—1935.	33·4	41·4	25·0	30·8	42·6	26·4

The seasonal distribution of 1,041 cases of the enteric group of fevers (British and Indian troops) for the years 1933, 1934, 1935 is shown in Table No. 11 below :—

Seasonal Distribution of the Enteric Group of Fevers British and Indian Troops 1933, 1934, 1935.

TABLE No. 11.

	Commands.				
	Northern.	Southern.	Western.	Eastern.	All-India.
	%	%	%	%	%
No. of cases	444	184	106	307	1,041
January	5·4	8·1	0·9	5·2	5·3
February	4·5	7·6	5·6	5·5	5·4
March	5·4	4·1	6·6	5·2	5·2
April	9·9	8·1	6·6	13·6	10·3
May	14·1	10·8	6·6	10·4	11·7
June	14·8	3·8	16·0	10·0	11·6
July	13·5	10·3	18·8	7·1	11·6
August	11·2	7·6	10·8	13·0	11·0
September	8·5	16·3	12·2	13·0	11·6
October	5·6	11·4	6·6	6·8	7·1
November	3·6	5·4	5·6	2·6	3·8
December	3·1	5·9	3·6	7·1	4·9

It will be seen that this group of diseases although occurring in all months of the year shows a very marked increase in incidence during the hot weather months most marked from May to September. In Northern Command, where the seasons are very distinct the high incidence in the hot weather months is particularly noticeable for typhoid fever both British and Indians. As regards the latter a percentage of the cases are regularly infected during their leave in their villages, the leave period coinciding with the hot weather months. Western Command statistics for British troops for the three year period show no cases of Typhoid during the period November—May. This seasonal incidence is in direct contrast to that of tropical typhus in India, and to the autumnal incidence found in England, and corresponds roughly with the incidence of fly breeding in the various commands. There were no epidemics to record in 1935. In Lahore District there were 14 cases more than in the previous year. Twelve cases occurred in August and September, and were probably contracted on the repeated journeys and moves necessary in connection with civil disturbances.

As pointed out later in connection with the dysentery group, it must be realised that the enteric group infections among the troops is only a reflection of the number of un-diagnosed cases among the mass of the civil population and the general insanitary conditions in proximity to the military areas with the difference that a certain amount of protection is available by means of T. A. B. inoculation, which is not the case for the dysentery group.

In the annual report of 1934, attention was drawn to the unsatisfactory results obtained with T. O. alcoholised suspensions in cases of the enteric group. A detailed analysis of the results of as many cases as possible has been carried out, of which certain of the results are given in Table No. 12 below. An attempt was made to ascertain first the titre of O agglutination which might reasonably be considered as the result of inoculation with T. A. B. vaccine as apart from disease, by considering only serological results obtained in the first few days (1—4) after admission to hospital. Twenty cases in which the first test was carried out on the 5th—7th day and which showed "O" agglutinins, in some cases to high titre, to be present were excluded from the analysis. On the other hand a certain number of cases which showed no agglutinins at as late a date as this after onset are included, the presumption being that agglutinins were absent also prior to this date. It is probable however that the percentages shewn are influenced to some extent by the onset of enteric fever. The results obtained from 565 such individuals are given in the 1st line of the table. Actually these cases were divided into monthly groups from the date of inoculation, but as there was little difference between those inoculated in the period 1—2 months, and the period 17—18 months, the figures given in the table represent the average over a period of 18 months from date of inoculation. It is a strange fact that the largest proportion of cases reaching the higher titres (over 1/100) was found in a group of 62 cases, who were within the 11th—12th monthly period after inoculation.

TABLE No. 12.

	Nil agglutinins present.	Agglutinins present but under $\frac{1}{25}$ titre.	Titre. $\frac{1}{25}$	Titre + $\frac{1}{25}$ — $\frac{1}{50}$	Titre $\frac{1}{50}$	Titre + $\frac{1}{50}$ — $\frac{1}{100}$	Titre $\frac{1}{100}$	Titre + $\frac{1}{100}$ — $\frac{1}{150}$	Titre $\frac{1}{150}$	Titre + $\frac{1}{150}$ — $\frac{1}{200}$	Titre $\frac{1}{200}$	Titre $\frac{1}{250}$	Titre + $\frac{1}{300}$
1) Inoculation T. O. agglutinins 565 individuals	69·7	...	11·5	1·5	8·3	0·3	...	4	...	...	0·7	2·8	0·5
(2) Highest titre of T. O. agglutination in 2nd or 3rd week of 169 Typhoid cases	32·5	...	8·5	0·5	11·2	2·3	0·5	11·2	1	1	0·5	13·2	10·2
3) Highest titre of T. O. agglutination in 2nd or 3rd week of 37 Paratyphoid A cases	·7	...	10·8	...	37·8	...	...	13·5	5·4	...	...	5·4	...
(4) Highest titre of T. O. agglutination in 2nd or 3rd week of 24 cases who died of typhoid fever	16·6	...	...	...	12·5	4·1	...	16·6	...	...	...	2·5	2·5
(5) Highest titre of T. O. agglutination in 2nd or 3rd week of 75 cases of Typhus group of fevers	56·5	5·0	18·4	5·5	5·0	3·9	...	2·6	...	1·3	...	...	1·3

Brief conclusions from a scrutiny of the four series of percentages given in this table are that using our present methods :—

1. There is no real base line of T. O. agglutination titre in an inoculated individual, above which enteric infection could be diagnosed by a single test, or in the majority of cases even by a series of tests.

2. At least 30 per cent. of typhoid cases produced no evidence of T. O. agglutinins by the second week, and in only 44 per cent. did the titre rise to over 1/50.

3. In a small group of 24 cases who died of typhoid fever it is seen that T. O. agglutinins were present in a much higher percentage, and to higher titres than in the ordinary type of case.

4. The typhus group of fevers appear to have a certain stimulating effect on the T. O. inoculation agglutinins as well as or the 'H' inoculation agglutinins as shown by the small percentage (56·5) with *nil* agglutinins as compared with the 69·7 per cent. present in group 1.

In the majority of such cases the rise in T. O. titre of agglutination did not exceed 1/50, but occasionally higher titres may be found.

The results in one such case, which illustrates well also the anamnestic reaction on T. A. B. " H " agglutinins is given in Table No. 13 below :—

TABLE No. 13.

	Day of Disease.						
	5	12	16	25	31	46	
Bact. typhosum 'H' . .	150	550	600	1,200	600	*Nil* test.	A case of Typhus fever (tropical) in which attack was severe, and pyrexia lasted 20 days—Typical rash present.
Bact. Paratyphosum A 'H' .	100	85	40	85	55	,,	
Bact. Paratyphosum B 'H' .	800	800	600	2,000	1,100	,,	
Bact. typhosum O . . .	50	125	175	125	50	,,	
B. Proteus OX2 . . .	*Nil.*	*Nil.*	*Nil.*	*Nil.*	*Nil.*	,,	
B. Proteus OX19 . . .	50	50	25	25	*Nil.*	,,	
B. Proteus OXK . . .	50	100,000	100,000	100,000	14,000	1,750	

The inoculation state, which is approximate only and is the average of the two half-yearly returns rendered is shown in Table No. 14.

TABLE No. 14.

Fevers of Enteric Group.

British Other Ranks, 1935.

Group.	Strength.	Actuals.		Ratio per 1,000.		Case mortality per cent.
		Cases.	Deaths.	Cases.	Deaths.	
Protected . .	52,048	97	8	1·9	0·15	8·25
Unprotected .	1,211	9	1	7·4	0·83	11·11

Table No. 15 gives the actual incidence of cases among these different classes, showing the types of fevers and the distribution between protected and unprotected.

TABLE No. 15.

Fevers of Enteric Group.

		Average strength	Admissions. Typhoid.	Para. "A"	Para. "B"	Para. "C"	Enteric group.	Total.
British Officers (British and Indian Service).	Protected	4,038	2	...	...	...	6	16
	Unprotected	272	1	2	...	...	5	
B. O. Rs.	Protected	52,048	25	13	...	...	59	106
	Unprotected	1,211	2	...	...	...	7	
Women	Protected	4,649	1	2	...	...	1	7
	Unprotected	326	2	...	1	...	...	
Children	Protected	5,872	2	...	...	...	3	17
	Unprotected	1,199	8	1	...	...	3	

Dysentery, Diarrhœa, Colitis and Amoebic Hepatitis.

11. The incidence for the last three years is shown in Table No. 16.

TABLE No. 16.

	Dysentery. Actuals.	Dysentery. Ratio per 1,000.	Diarrhœa. Actuals.	Diarrhœa. Ratio per 1,000.	Colitis. Actuals.	Colitis. Ratio per 1,000.	Total. Actuals.	Total. Ratio per 1,000.	Amœbic Hepatitis. Actuals.	Amœbic Hepatitis. Ratio per 1,000.	Liver abscess. Actuals.	Liver abscess. Ratio per 1,000
1933	1,369	24·9	842	15·3	53	1·0	2,264	41·2	36	0·65	7	0·13
1934	1,538	25·5	811	14·9	42	0·8	2,242	41·2	52	0·96	5	0·09
1935	1,536	29·2	734	13·9	19	0·4	2,289	43·5	24	0·46	4	0·08

The admission ratio for dysentery increased by 3·7 per 1,000 in 1935. The diarrhoea admission ratio decreased by 1·0 per 1,000, and that for colitis by 0·4 per 1,000. The average sick time in days decreased by 286·79 per 1,000. The average number of days lost per 1,000 of strength was 598·19.

Four cases were invalided (2 amoebic dysentery, 2 bacillary dysentery) as compared with 10 in 1934. There was 1 death from bacillary dysentery during the year.

Dysentery cases were, as usual, sporadic in occurrence, the main incidence corresponding with the fly season. There were no epidemics with the exception of a small outbreak in the 2nd Battalion of the Royal Scots in Lahore (16 cases) which was found to be caused by *B. sonne*. Apparently this bacillus is comparatively common as a cause of dysentery in the Spring months of the year in that area, being replaced by the Flexner group in the warmer months. A small outbreak among the Indian platoon attached to the 20th Rifles in Burma is of interest in that one of the newly discovered strains of dysentery bacilli (known in India at the moment as P. 288) was isolated in practically pure culture from every case. The hospital admissions for this group of diseases during the six year period 1930—1935, when compared with the period 1920—1925 are very interesting, particularly so if the admissions among Indian troops are considered for the same period.

It may be pointed out that in the year 1925 the reorganisation of the military laboratories on the lines of the home organisation was commenced, and that about this period also the high incidence of bacillary infections among the troops in India was brought to notice. The period 1925—1929, may therefore be considered as an intermediate period during which reorganisation was progressing, and a knowledge of modern methods of diagnosis of the dysentery infections increasing among medical officers. The strength of British and Indian troops varied little from year to year during the above periods the average for 1920—1925, being British 59,218, Indian 120,771 and during the period 1930—1935 British 55,613, Indian 120,771. Ratios per 1,000 are therefore not given in Table No. 17 and the figures represent only the total hospital admissions.

TABLE No. 17.

	British Other Ranks.				Indian Other Ranks.			
	1920—1925.		1930—1935.		1920—1925.		1930—1935.	
	C.	D.	C.	D.	C.	D.	C.	D.
Bacillary dysentery	402	10	5,470	3	241	9	7,892	17
Amoebic dysentery	3,176	25	1,079	0	3,272	47	814	1
Clinical dysentery	497	7	1,987	1	4,281	74	2,767	11
Diarrhoea	5,878	0	4,960	0	14,627	8	5,065	0
Colitis	1,420	2	187	0	15,485	42	167	2
TOTAL	**11,373**	**44**	**13,683**	**4**	**37,906**	**180**	**16,705**	**31**

C=Cases. D=Deaths.

The extraordinary contrast in diagnoses, the large reduction in the number of deaths and the slight increase in admissions among British troops, as compared with the huge fall in total admissions among Indian troops can perhaps be better appreciated if only the difference in admissions between the two periods are observed.

TABLE No. 18.

Total admissions 1930—1935 contrasted with 1920—1925.

	Bacillary dysentery.	Amoebic dysentery.	Clinical dysentery.	Diarrhoea.	Colitis.	Total admns. for group.	Deaths.
British troops	+5,068	—2,097	+1,490	—918	—1,233	+2,310	—40
Indian troops	+7,651	—2,458	—1,514	—9,562	—15,318	—21,201	—149
Total British and Indian troops	+12,719	—4,555	—24	—10,480	—16,551	—18,891	—189

In the report on the health of the Army in India, 1934, the practically stationary annual admission ratio among the British troops was commented on. It requires however to be realised that in the great majority of stations in India, the method of disposal of excreta is still by means of the bucket (fly proofed in British lines)—sweeper—and incineration method. In some cases incineration is carried out in the vicinity of the latrines. In others cartage in filth carts to incinerators at a distance is necessary, while in a few tations the most unsatisfactory method of cartage, and burial of excreta is till in vogue.

The introduction of water carriage systems of sewage disposal is for the time being largely ruled out either on financial grounds, or lack of water, and should they be introduced at a future date will probably cause little reduction in the incidence of these diseases unless adequately provided also for the private servants, regimental followers and families, and for the Indian population of military cantonments generally. It is this population, not the troops, which supplies the source of infection, the vector (fly), and whose sanitary arrangements (open pan latrines, often deficient in number, in siting, and staff) are very defective. In addition barracks and cantonments are frequently sited within easy fly range of cities, municipal areas, villages, and bazaars, sanitary conditions in which from a modern public health European standard are to all intents and purposes non-existent. At certain times of the year flies swarm into the military areas from these places, and an early morning walk along any of the small nullahs, ditches, etc., in close proximity will quickly demonstrate the impossibility of the prevention of this group of diseases until such time as efficient sanitary services, and a sanitary conscience have developed throughout the country.

It is feared therefore that the incidence of the diseases will remain in the same stationary condition for many years to come.

One of the striking features of the post-earthquake period in Quetta was a dramatic fall in the dysentery incidence among the troops in the station. For several years previously the incidence in this station had been high, and increasing inspite of the most stringent sanitary precautions in the military area.

The small increase recorded among British troops is considered to be mainly due to the milder type of cases now admitted to hospital, which previous to 1925 were frequently treated as out-patients. The improvement in treatment following on more accurate diagnosis is obvious at a glance at the reduced death rate.

The fact that from 1930—1935 there have been 21,201 fewer admissions among Indian troops is a reflection of the steadily improving sanitation among Indian troops since the post war period, but, as in the case of British troops it is feared that the position has now become more or less stationary. The improvement in diagnosis, and treatment is equally well marked by a reduction of 149 in the number of deaths, the percentage mortality dropping from 0·47 per cent. to 0·18 per cent.

The hepatitis (all causes) and liver abscess incidence compared over similar periods follow closely the figures given above.

TABLE No. 19.

	Hepatitis all causes including amoebic.				Liver abscess.			
	1920—1925.		1930—1935.		1920—1925.		1930—1935.	
	A.	D.	A.	D.	A.	D.	A.	D.
British troops	948	4	417	2	184	53	46	5
Indian troops	681	10	358	1	84	23	37	5

The proportions of the different types of dysentery occurring in 1935 are almost identical with the results obtained in 1934, the total percentage of the bacillary cases being identical even to the decimal point.

TABLE No. 20.

	Admissions.	Percentage.	
Dysentery Protozoal . . .	158	10·3	
Dysentery Bacillary (bacteriologically proved)	637	41·5	64·5
Dysentery Bacillary Exudate. (No dysentery bacilli isolated) . . .	353	23·0	
Dysentery clinical	388	25·3	
Total . .	1,536		

Table No. 21 is an analysis of the bacilli isolated from all specimens submitted to laboratories during the past 5 years.

The scheme for the investigation of the mannite fermenting group of bacilli hitherto unclassified was continued throughout the year. The results of this investigation were published by Major J. S. K. Boyd in the R. A. M. C. Journal of January 1936. The conclusions arrived at are briefly as follows :—

1. Dysentery group bacilli isolated by Major Boyd in Bangalore and Poona of types not described in "A System of Bacteriology 1929" have proved to be widely distributed throughout India.
2. Using a system of classification in which these strains are included it is now possible to identify practically all dysentery group bacilli found in India.
3. The evidence as a whole is strongly in favour of the belief that the majority of these "new" strains (three of which have been found in other countries) are capable of causing dysentery.

Brief details of the scheme for classification of dysentery bacilli used in the military laboratories are given later in this report in the section referring to the laboratories.

TABLE No. 21.

	Non-mannite fermenting.			Mannite fermenting.					
Year.	Shiga.	Schmitz.	Total.	Andrews' Types.	Sonne.	New Types.	Unclassified.	Total.	Percentage unclassified.
1931 . .	340	79	419	1,138	69	..	331	1,538	21·5
1932 . .	384	126	510	1,007	108	126	152	1,393	10·9
1933 . .	253	80	333	960	198	315	91	1,564	5·8
1934 . .	191	95	286	921	202	313	27	1,463	1·8
1935 . .	**230**	**106**	**336**	**798**	**292**	**392**	**10**	**1,492**	**0·7**

Tropical abscess of the liver and hepatitis.

12. There were 56 admissions for hepatitis, of which 24 were considered to be definitely amoebic in origin, and 10 cases in which the aetiology of the hepatitis was doubtful. Three of the former group of cases had two admissions to hospital. As in 1934, there were 3 cases of Tropical abscess—all recovered. One death from multiple liver abscesses occurred during the year, but these were pyaemic in origin and followed on the rupture of a gangrenous appendix.

Malaria.

TABLE NO. 22.

13. *Admission Ratio per 1,000—British troops.*

Commands.	Total.		
	1933	1934	1935
Northern	159·8	75·8	57·3
Eastern	62·6	48·1	44·8
Southern	60·6	55·3	48·9
Western	204·0	160·4	136·1
Burma District	39·8	54·9	29·2
All-India	103·3	67·5	56·1

It is satisfactory to record that the incidence in 1935 is 11·4 per 1,000 lower than that in 1934, which was up to that date the record year. The position is even more satisfactory than appears, when the fact is taken into account that frontier operations in a notoriously unhealthy area and during the malaria season were undertaken. In addition British troops in Northern Command were brought down from the hills in connection with civil disturbances during the malaria season.

On the other hand monsoon conditions all over India generally were favourable to a low malaria incidence, *e.g.*, in the north the winter of 1934-35 was cold, as was the spring in 1935. Monsoon rains were reduced below normal, and the autumn months were cold.

The admission ratio has been reduced in all four commands, and also in Burma. In Northern Command the incidence of fresh malaria infection was slightly increased (3·9 per 1,000), but the ratio of admissions for relapsed cases dropped by 22·4 per 1,000, thus reducing the total admissions. An increase in both fresh and relapse cases also occurred in Meerut District. Temperature and humidity were favourable early in the year for mosquito breeding in Meerut where most of the cases occurred, and defects in malaria control measures taken by units in that station added the necessary factors for an increase of malaria infections.

Although the total admissions for the past two years have shown so great a fall, minor incidents such as above indicate that any relaxation in anti-malaria measures will be at once reflected in an increased incidence. For example in Lahore, where mosquito proofing of Barracks has been successful in reducing the incidence for several years, 29 cases of fresh infections out of a total of 34 from the whole cantonment occurred in one battalion. Twenty of these cases were from one company, and on investigation it was found that the mosquito proofing over the skylights in the barrack room had been broken. Repair of these and fumigation of the barrack room stopped further incidence. Poona and Kirkee are the only stations in Southern Command in which a reduction in incidence did not occur. The greater percentage of the cases in these stations occurred among troops acting as guards in the arsenal at Kirkee, and a further proportion occurred in camps, which had been occupied earlier than usual and before pools have been given time to dry after the rains. In Jubbulpore, a station which has always given trouble fewer cases occurred in 1935. An interesting analysis of the malaria statistics in that station by Major T. Young, R.A.M.C., shows that the malaria incidence is greater each year in the unproofed portion of the barracks than in the proofed, partial proofing

only having been carried out to date owing to lack of funds. The following is a list of stations with strengths of over 500 in which the malaria incidence exceeded 100 per 1,000 (the all-India ratio being 56·1).

	Admission ratio per 1,000.
Quetta	171·8
Peshawar	132·2
Agra	116·3
Nasirabad	113·0
Allahabad	101·4

Quetta, the second worst station in this respect in 1934, moved up to the top of the list in 1935. Endeavours are being made to ensure that in the new cantonment, which is to be built, matters in this respect will be improved. The mosquito breeding areas are however sited mainly in areas not under military control, and as in the case of the dysentery and enteric group of fevers a reduction or not in the incidence will depend largely on the extent of control carried out by the civil authorities.

In Delhi which figured among the most malarial stations in the 1934 report a reduction from 169 to 87·5 per 1,000 occurred. This is the most satisfactory figure for many years.

The percentage in which benign tertian and malignant tertian cases occurred in the four commands in India is given below :—

Command.	Total malaria cases.	Benign tertian.	Malignant tertian.	Mixed B. T. & M. T.	Clinical.
		%	%	%	%
Northern	956	75·5	15·8	1·9	6·8
Southern	706	61·5	29·6	4·0	1·7
Eastern	708	76·6	16·1	1·6	5·4
Western	532	79·9	18·6	0·5	0·6

In Southern Command 23 cases of Quartan infection (3·3 per cent.) were reported. Plasmodium malariae is comparatively rare in the other commands. Two cases only occurred in Eastern Command and one in Western Command among British troops. None were reported from Northern Command.

There were 4 deaths during the year, of which two were P. falciparum infections, one a P. vivax infection, and in one both species were present. No death occurred in Northern or Southern Commands. The percentage of cases diagnosed only on clinical grounds without positive microscopic confirmation is considered to be creditably low particularly in the Southern and Western Commands and reflects the great improvement in the clinical side room work in hospitals during the past few years.

Treatment has been carried out mainly with Atebrin followed by a course of Plasmoquine, or Quinine and Plasmoquine concurrently for 21 days. An examination of 2,768 case cards of cases of malaria among British troops, disclosed the fact that there appears to be among the medical officers treating cases no particular preference for either method of treatment. 1,381 were treated with Atebrin and Plasmoquine, and 1,060 by Quinine and Plasmoquine. From an administrative point of view the former seems preferable

as the length of time off duty is shorter. There is a fairly universal consensus of opinion that Atebrin does not always reduce the temperature promptly or prevent in Benign Tertian cases a further rise in temperature after 48 hours from commencement of treatment. It is recommended therefore that treatment for the first 48 hours should be by Quinine (grs. xx per diem) followed by a 7 days course of Atebrin (0·3 grm. per diem), a three day interval and finally a five days course of Plasmoquine (0·03 grammes daily for five days).

The question of the effect of these synthetic drugs in diminishing the relapse ratio in Benign Tertian cases has been discussed fully elsewhere. No useful purpose is therefore served by going into this matter further. Statistics for Indian troops are considered useless, as a large proportion proceed to their villages on leave during the malaria season and are infected there. It is also very difficult in practice, even with a full knowledge of those academic distinctions found in text-books, to distinguish between relapses and fresh infections during the malaria season with any degree of confidence. Opinions therefore can only be general.

One outstanding fact is definite however, *viz.*, that since the almost universal use of Plasmoquine in the Army in India the chronic relapsing cases of Benign Tertian malaria, which used to be gathered together in the Malaria Treatment Centre, Kasauli, no longer exist in any appreciable number, if any.

In this connection the following incident is of interest. It was noticed that a group of 30 odd cases of Benign Tertian malaria in Burma had been treated with Quinine alone. As this is contrary to present general procedure enquiries were made, which elicited the fact that a medical officer being impressed with the recommendations in the quarterly Bulletin of the Health Organisation of the League of Nations of June 1933, had carried out treatment on the lines suggested in this publication. Almost without exception every case relapsed, and treatment in future was carried out on the usual lines in India, as indicated above.

The "relapse" figures for British troops in Northern Command from the year 1930 are given below :—

	Per 1,000.
1930	120·6
1931	76·5
1932	49·8
1933	39·6
1934	35·6
1935	13·2

Trials with Atebrin musonate were carried out in Southern and in Northern Commands. Of 75 cases treated in Southern Command 30 shortly relapsed. In Northern Command the figures appeared to be more satisfactory, but as the experiment was carried out on cases infected during the Mohmand Operations who were in process of evacuation to their permanent stations, statistics sufficiently reliable to base conclusions upon regarding the relapse percentage were not obtained. Among both groups of cases however medical opinon was definite that pyrexia was quickly controlled by the injections with this drug. An important observation bearing on this fact was that cases treated in Field Ambulances by injections of Atebrin Musonate arrived at the base hospital in Peshawar in a much fitter condition than those treated in the usual way by the oral method. For cases therefore admitted to field medical

units Atebrin Musonate would appear to be the most suitable form of treatment. With our present knowledge however further treatment will have invariably to be instituted in the base hospital, a minor matter if a comfortable journey to the base can be provided.

Incidence of malaria during the Mohmand Operations, 1935.

The admissions from all causes during the period of these operations and also for malaria are given in Table No. 23.

TABLE No. 23.

	Strength.	All causes. Admns.	All causes. Ratio per 1,000.	Malaria. Admns.	Malaria. Ratio per 1,000.
British Officers	264	42	159·1	12	45·4
British Other Ranks	2,622	1,417	540·4	708	270·0
Indian Officers and Indian Other Ranks	9,940	2,184	219·7	1,192	119·9
Followers	1,244	264	212·2	166	133·4

Operations were carried on from 15th August to 15th October, the height of the malaria season in a notoriously malarial area, resulting in a large number of malaria infections among the force, although considerably less than in 1933, which was a severe malaria year.

An anti-malaria officer was appointed to the force, but unfortunately he only arrived two weeks after the commencement of operations, and it was at least a week before the staff working under him could be considered as working on proper lines, by which time the mischief had been done, and active operations commenced with an already infected force. Unfortunately camps which apparently must be occupied such as Kila Gai, Dand and Chalanai, are situated close to streams over grown with vegetation and breeding enormous numbers of anophelines including *A. culicifacies* and *A. stephensi*.

The usual measures such as canalising, oiling the stream, and clearing vegetation from its banks were eventually carried out, at first by working parties detailed by units. This method proved unsatisfactory as working parties were not always available when required, and eventually coolies trained in anti-malaria work at Peshawar were engaged, who carried out the work under the supervision of one specially selected sub-assistant surgeon in each camp.

Flit guns and flit solution were freely issued for destruction of adult mosquitoes in tents, etc., but it is stated that very little use was made of them.

The incidence of malaria began to rise by 8th September, the maximum number of admissions to field medical units being on the 18th September, when 123 cases of malaria were admitted.

After this date, probably due to the anti-malaria measures becoming effective, the daily evacuation of cases to field medical units was approximately 25 per day to the end of the month. As however the number of admissions was again tending to rise 10 grs. of quinine acid hydrochlor daily for 10 days was administered to the most infected units.

This method of keeping down admissions is now popularly known in the Army in India as treatment with Delay Action Quinine; in lieu of the old term prophylactic treatment.

The conclusion reached as in the 1933 operations, was that " it afforded valuable assistance as regards keeping the troops on duty for a more or less limited period ".

Three pairs of field service panniers were fitted out in Southern Command laboratory for the use of field ambulances in the diagnosis of malaria and dysentery in the field. One pair was sent to the District laboratories in Peshawar, Rawalpindi and Quetta for issue to field ambulances mobilising in these stations.

It is intended that these should become an authorised article of equipment for all field ambulances, and possibly other field medical units in due course.

Venereal Diseases.

TABLE No. 24.

All-India.	Gonorrhoea.	Syphilis.	Soft-chancre.	Total.
1931	29·5	6·8	6·2	42·6
1932	26·1	6·0	5·5	37·7
1933	23·2	4·9	5·0	33·4
1934	25·2	4·5	4·1	34·1
1935	**25·8**	**6·0**	**6·8**	**38·8**

From the above table it will be seen that venereal disease has increased during the last two years ; this is due to increases in the Southern and Eastern Commands. Burma District still accounts for the greatest number of cases but admissions were less this year than last year. Western Command continues to have the lowest incidence.

The stations with the highest admission rates were nearly all " one unit " stations, the majority being in Southern and Eastern Commands.

Mandalay had the highest admission rate with 272·73 per 1,000 but this only represents 36 cases. Dacca in Eastern Bengal was second with 180·07 per 1,000 representing 103 cases.

Dacca is a good example of how boredom and the presence of sources of infection combine to increase the incidence of venereal diseases. At this station the troops live in thatched huts and cannot visit the adjacent town on account of the terrorist movement so that they are dependent on their own resources for amusement. At the same time there is ample opportunity for exposure to infection in the vicinity of barracks.

The percentage of relapse cases of gonorrhoea was 23·2 and the average number of days in hospital was 47·22 for this disease. Routine treatment was by lavage with alkaline potassium permanganate. The use of Gonococcus exotoxin was found to reduce somewhat the length of time in hospital and in obstinate cases which did not respond to exotoxin a polyvalent gonococcus vaccine gave beneficial results.

Syphilis has been treated with both Sulphostab and Metarsenobillon. Several cases have occurred of severe reactions to the latter.

Dmelcos vaccine has been found to be very satisfactory in the treatment of soft chancre and it appears to reduce the incidence of adenitis in these infections.

One case of lymphogranuloma inguinale was of interest in that the initial clinical symptoms led to a provisional diagnosis of typhoid fever and the true nature of the case was not revealed until the full development of the local lesion.

Smallpox.

15. Table No. 25 shows the half-yearly state of vaccination of British troops and families.

TABLE No. 25.

	Percentage protected.	
	On 31st March.	On 30th September.
British Officers	98·93	98·49
British Other Ranks	98·61	99·72
Wives and Children	99·05	99·15

In spite of this high state of protection there were 8 cases of smallpox during the year : three of these were British other ranks, 3 were wives and 2 were children and all of them had been vaccinated within five years. All except two of the cases occurred in the month of May and six out of the 8 cases were infected in the United Provinces. In 1934 there were 9 cases of which 1 was a British officer, 6 were British other ranks and 2 were women or children.

Tuberculosis.

16. TABLE No. 26.

	Pulmonary Tubercle.	Tuberculosis of organs other than the lungs.	Pulmonary tubercle.
	Actuals.	Actuals.	Ratio per 1,000.
Admissions	54	15	1·0
Deaths	3	1	0·06
Invalids	35	9	0·66

There were two cases of pulmonary tuberculosis less than in 1934 and 16 fewer invalids sent to the U. K. but there were 2 more deaths.

Diseases of the Respiratory System.

17. Excluding pulmonary tuberculosis there were 1,217 admissions for respiratory diseases giving a ratio of 23·1 per 1,000 which is 1·3 more than in 1934. There were 164 cases of lobar pneumonia of which 19 died, thus showing a case mortality of 11·6 per cent. Out of 58 cases of broncho-pneumonia, 2 died, the case mortality thus being 3·4 per cent. Bronchitis accounted for 757 admissions and pleurisy for ninety-three.

Diseases of the Digestive System.

18. There were 5,014 admissions as compared with 5,582 in 1934. This is a very substantial decrease as compared with the two previous years when there were decreases of about 80 cases in each year.

	1934.	1935.
Tonsillitis	1,696	1,494
Diarrhœa	811	734
Appendicitis	475	423
Pharyngitis	441	420
Jaundice	397	353
Constipation	346	332
Gastritis	342	307

Reference to Table No. 16 (Dysentery, Diarrhoea and Colitis) shows that while there has been a greater increase of dysentery as compared with the previous year there has been also a concomitant decrease in diarrhœa although this disease has gone up from tenth to ninth place in the principle causes of admission to hospital.

Diseases of Areolar Tissue and Local Injuries.

19. Although there has been a slight reduction in the incidence of diseases of the areolar tissue, these still rank second only to malaria in the production of inefficiency through sickness. Admissions totalled 2,809 for cellulitis and 473 for boils giving ratios per 1,000 of 53·4 and 9·0 respectively.

The admissions for local injuries were also slightly lower than in the previous year and were as follows :—

	Actuals.	Ratio per 1,000.
Sprains, contusions and abrasions	1,767	33·6
Gunshot wounds	33	0·6
Other wounds	303	5·8
Fractures	710	13·5
Dislocations	182	3·5

There were 32 deaths from local injuries which was 5 more than in the previous year.

Effects of Heat.

20. In spite of the fact that more British troops in the Northern Command than usual had to remain in the plains during the hot weather on account of military operations and civil disturbances, the total number of admissions for effects of heat was exactly the same as last year. Out of the total of 90 cases, 78 were heat exhaustion, 11 were heat-stroke and 1 was sun-stroke. There were 8 deaths compared with 9 in 1934.

Hygiene.

21. A summary of work carried out at the Military Food Laboratory, Kasauli, during 1935 is given in Table No. 27.

TABLE No. 27.

Source of sample.	Number of samples received.	Accepted.	Rejected.	Percentage of rejections.
On offer or for acceptance.				
Direct from overseas . .	674	372	142	21·1
Indian products . . .	945	530	315	33 3
Grains from grain depots .	3,113	3,010	99	3·2
Wheat products from controlled mills	600	600	..	..
Bran from other than controled mills . . .	1,189	1,000	187	15·7
Ghi from Ghi Heating Centre, Agra . .	4,460	4,280	..	..
From I. A. S. O. stocks for periodical analysis . .	1,653	1,602	11	0·7
From units on complaint or for advice	1,605	1,160	311	19·4
Total .	14,239*	12,554+	1,065	7·5

Forty-four per cent. of samples manufactured abroad were rejected but this high percentage was partly due to fifteen samples of *ghi* which were received from New Zealand and which were found unsuitable.

The high proportion of rejections of milk, jam, cheese and preserved meat point out the necessity for careful selection of such articles.

Goods manufactured in India showed a large percentage of rejections owing to the poor quality of articles purchased in bazaars for comparison with present supplies.

Samples of essence of meat from firms of world wide reputation, when submitted by Indian firms, are frequently found to be unsatisfactory.

Barley has been poor and weed-ridden during the year but wheat products have been of great consistency and high quality.

Bacon has given cause for dissatisfaction owing partly to the fact that samples taken from consignments on arrival at ports in India show signs of age and partly because supplies that are apparently fresh on tender rapidly deteriorate after acceptance. The best supplies were from an English firm and consisting of the middle cut divided into 2 or 3 portions each of 10 lbs. and packed under negative pressure in tin containers.

Ghi storage tests were carried out during the year and indicated that *ghi* of good quality and packed in sealed tins will keep for long periods. It has been found that *ghi* with an acidity of over 11 points is liable to develop sufficient acidity to exceed this figure within a year, therefore the acidity of *ghi* which is to be stored should not exceed 8 points.

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* In 124 cases further samples were called for.

† The remainder of the samples received represent special examinations, including 35 of drinking water.

The work done at the Ghi Testing Laboratory, attached to the Ghi Heating Centre at Agra, showed that a high standard of ghi was being supplied to the Army for out of 4,384 samples examined after heating, only 34 were rejected.

The installation of electrical heaters has produced a clean and noiseless Laboratory well up to the modern standards.

Food.—Tests on a large scale were carried out in the Northern Command with a modified Shakapara biscuit and as a result two new types of biscuit have been adopted, namely, a sweet and a salt. The proportion in which they will be issued is 3 sweet to 1 salt—and a revision of the hard scale of rations is being examined.

Water supplies.—Chemical analyses of all station water supplies have been carried out at the Military Food Laboratory, Kasauli, and the chloramination method of sterilizing drinking water was tested with the different samples. As a result it has been decided to adhere at present to the older method of chlorination for field service.

Improvements to the water supplies by installation of filtration and chlorination plants have been carried out as funds were available but there are still many stations without piped water supplies.

Dress.—Sun helmets—In certain stations in Northern Command the wearing of sun helmets during the cold weather was not considered necessary and under certain conditions permission was granted for the wearing of peaked Service caps on parade.

Air conditioning.—Experiments were carried out on a hospital ward in the British Military Hospital, Delhi. The results were so good that it was decided to experiment on hospital wards in other hot plains stations next year. The method tried was by means of *khus-khus* screens on doors and windows ; these screens were kept moist by means of a water drip-feed from overhead tanks and air was drawn through the screens into the ward by electric fans.

Barracks and Quarters.—All newly constructed British barracks will in future be provided with medical inspection rooms and these will be provided as funds become available in existing barracks where necessary.

Revised scales for quarters for officers (both married and single) and lady nurses have been authorised. The new quarters provide for all essential requirements and will be more comfortable than the existing ones.

Warrant Officers, Class II, now get class IX quarters which have been re-designed to be convertible so as to have one, two or three bedrooms, thus coming into line with the arrangements for soldiers' married quarters in U. K.

Improvements to existing and provision of new quarters at an approximate expenditure of 9½ lakhs, for British married personnel were carried out at various stations.

Special efforts were made to bring up the existing accommodation for Dining Halls and Cookhouses for British troops up to scale. An approximate expenditure of Rs. 1,40,000 was incurred at Jhansi, Meerut, Karachi, etc.

Sanitary Survey.—Owing to the unhealthy conditions prevailing at Ranikhet in the Lucknow District, a special sanitary survey of the station was carried out.

As a result the sum of Rs. 12,000 was allotted for immediate improvements in the military area and a 3 year plan for further work was drawn up. Pressure was also brought to bear on the Cantonment authorities to improve

the very defective sanitation in the bazaars (largely responsible for the unhealthiness of the station) and to start a deforestation scheme to ventilate and allow access of sunlight to the effluents of drains. The work carried out during the year consisted of fly-proofing married quarters near bazaars, provision of grease traps and soakage pits and improvements of latrines and urinals.

Fly proofing.—Fly proofing in India is frequently found to be unsatisfactory after it has been in use for a short time, chiefly owing to faulty construction and to the wooden frame work warping. It is particularly noticeable in latrines where fly proof flaps at the back come in for rough handling owing to having to be lifted in order to allow withdrawal of the pans. Latrine seats also are frequently unsatisfactory on account of the pan not fitting closely under the seat and the lids being early broken. A new type of iron latrine seat and lid and an iron framed flap at the back of the latrine is being tried at Ranikhet. Experiments are also being carried out at Rawalpindi.

Conservancy.—The disposal of sewage from quarters by means of water carriage into (individual) septic tanks has been found very satisfactory in Northern Command and such installations are now being provided in Eastern Command.

It was hoped that the scheme for provision of a water carriage system in Fort William, Calcutta, would be started this year but this was not possible, as the funds which had been sanctioned for the project had to be diverted on account of the Quetta earthquake—Funds are provided in the 1936 budget for this work.

Experiments were made with an automatic self-dosing device for the Rattersley method of treating sullage water with ferrous sulphate and lime. The apparatus was found satisfactory but there were several minor improvements required and the experiments were still in progress at the end of the year.

Portable disinfector.—Experiments from the transport point of view were continued by the I. A. O. C. on the portable disinfector which had been accepted by the medical directorate in 1934. This disinfector is not suitable for pack transport and will be carried in M. T. vehicles or horse drawn transport. It is hoped that it will form the standard pattern portable disinfector for India in both peace and war.

Quetta Earthquake.

22. Details of this disaster and the emergency measures taken to combat it have already been recorded in an official pamphlet published by the Government of India from which the following is a brief extract :—

" At three minutes past three on the morning of May 31st, 1935, Quetta and the surrounding districts were shaken by an earthquake that lasted for 25 seconds. During this short period practically the whole of Quetta city was destroyed ; the military cantonments to a great extent escaped but the Royal Air Force suffered heavily, out of an establishment of 656 of No. 3 (Indian) Wing 148 persons being killed and over 200 injured while out of 27 aircraft only 3 escaped damage.

It was fortunate that the military cantonments escaped serious damage for within half an hour of the occurrence of the disaster troops were on the spot and military control was established in place of the civil police and other administration which had been wiped out.

The first and most immediate need was transport as most of the vehicles in the City had been smashed. Every available vehicle in cantonments was used to bring troops into the area and were then used in addition to the military motor ambulances to take casualties to the military hospitals which were soon overflowing with patients. The Civil and Missionary hospitals had been destroyed and the walls of the military hospitals were cracked and unsafe so that verandahs and tents had to be used.

On the day of 31st May 345 inpatients were received into the British military hospital and approximately 600 were treated as outpatients.

The Indian Military Hospital soon became a large Casualty Clearing Station dealing with casualties at the rate of 200 an hour and by the evening of June 1st, 4,500 cases had been treated including 450 major operations, 300 fractures and 1,200 anaesthetics. During the period 31st May to 14th June between 20,000 and 25,000 casualties were treated.

Extra medical assistance was on its way from India, within a very short time but until this arrived the staffs of the two military hospitals, with civilian assistance, carried on night and day without rest in spite of the fact that several of them had been injured. The gallantry of the British women of Quetta must be recorded. Within a few hours of the occurrence of the earthquake a hundred officers' wives reported for duty at the hospitals and took over even the most menial task in spite of the fact that many of them were without any experience of hospital or first aid work.

The work of dealing with casualties was greatly assisted by the fact that there were large medical Mobilization Stores and an Arsenal in Quetta and therefore large quantities of medical supplies, blankets, stretchers, tents and other material were quickly available. Within 12 hours the arsenal issued 1,000 tents, 5,400 blankets and 500 stretchers besides innumerable picks, shovels and other articles. Similarly the Supply Depot was able to answer the call for large quantities of rations.

By 6 A.M. on the 31st May a Relief Headquarters was established on the lawn of the ruined Quetta Club and the city and civil lines were subdivided into areas allotted to military units for rescue work.

A refugee camp was organised on the race course and polo grounds by officers of the Staff College. Burial places were selected for the dead. A police force was organised and guards and patrols were formed in the city to direct traffic and prevent looting.

Communications with the outside world had been cut off except by wireless as most of the railway and postal and telegraph personnel were dead but the Royal Corps of Signals very quickly repaired the civil telegraphs and re-established communication.

Water and electric light supplies were disorganised as most of the personnel for these services lived in the city and had been killed or injured; of the M. E. S. alone 27 had been killed. The Sappers and Miners took over control and although the 10 inch water pipe line to the city was badly damaged and difficult to repair, an adequate water supply was maintained. Similarly the Sappers and Miners took over the electric power station and were able to supply electric light to the hospitals at night.

News of the earthquake was received at A. H. Q. by wireless on the morning of 31st May and at once the whole of the resources of the Army was put at the disposal of Quetta. Fourteen medical officers, 16 nursing sisters, 12 I. M. D., 120 nursing orderlies and six tons of medical stores were sent at

once by air and rail and they were followed by three sections of a Field Ambulance from Waziristan and 2 Sanitary Sections from Eastern Command. All available ambulance trains were also put into commission.

As soon as the news of the earthquake became public several hundreds of passengers travelled to Quetta. Food and accommodation for such a rush were not available and therefore only those on official duty were allowed past Sibi where a Traffic Control Post was established.

Special trains were run from Quetta for the evacuation of refugees and wives and children of British and Indian troops. The evacuation of British women and children was complicated by outbreaks of chicken-pox, measles and dysentery among the children, but they were sent to Karachi and eventually to the U. K. by a steamer chartered for the purpose. Difficulty was experienced in embarking the infectious cases on account of the Port Health Rules but with the help of the Secretary of State for India arrangements were made with the Quarantine Board, Egypt, to facilitate the passage of the ship through the Suez Canal.

Rescue work had gone on unceasingly in Quetta and all the living had been extricated from the ruins in the first 36 hours. By June 3rd, it was realised that any who were entombed must be dead and as the smell from the city had by this time become appalling and there was grave danger of an epidemic it was decided to evacuate the area and seal it. A cordon of barbed wire had been placed round the city and after a thorough search to remove everyone the area was closed and surrounded by sentries to prevent ingress.

Martial law was established from the 1st of June until the 28th June when the civil administration resumed control."

The reconstruction of Quetta cantonment is being undertaken and the work is being co-ordinated by a local Reconstruction Committee at Quetta and a Central Reconstruction Committee at A. H. Q.

Mohmand Operations.

23. Operations were undertaken in the Mohmand country, consisting of bare rugged hills 3-6 thousand feet high enclosing narrow valleys in which the water courses are mostly dry.

The Peshawar Brigade moved out on August 15th and were followed two days later by the Nowshera Brigade and in September by two more Brigades. The operations continued until the end of October.

Climatic conditions were not severe except during August and September. The only cases of heat exhaustion or heat stroke occurred in these months there being 2 cases in the former and 15 in the latter month.

The incidence of malaria and the outbreak of cutaneous diphtheria in a British unit of the Mohmand Force are described elsewhere in this report.

Intestinal diseases did not play any important part in these operations. Four sub-sections of sanitary sections were mobilized, but none was attached to the force for over a fortnight after the troops moved out with the result that the sanitation of camps during this period left much to be desired. This might have been avoided if sanitary personnel had been included among the first troops to move.

All troops and followers were inoculated against cholera before leaving their peace stations and although cholera was prevalent among the civilian population, no cases occurred in the force.

Considering the adverse conditions under which they were serving, and apart from malaria, the health of the troops throughout was remarkably good.

The water supply for the whole force, except for a short period in one camp, was taken from one source and distributed to the different camps after chlorination.

Troops were on field scale of rations which were sufficient and satisfactory. Dairy products were sent up daily from the Government Dairy Farm at Peshawar; milk being kept cool in transit by means of cylindrical ice containers in each can. Ice was issued to British troops and a special issue of 4 bottles of mineral water per man per day was made to British personnel of Armoured Cars and the Light Tank Company while employed on road duties.

Loe Agra Operations.

24. From February to June a brigade from Peshawar operated in the Loe Agra area, west of Malakand. The health of the troops was good throughout. The total sick rate of 96·42 per 1,000 compared very favourably with that in the Mohmand Operations when it was 668·8 per 1,000. The Loe Agra operations were however carried out during the healthy season whereas the Mohmand Operations took place during the most malarial months in the year.

The chief discomfort to the troops was from the swarms of flies, which were present in many of the perimeter camps, owing to the presence of large numbers of labourers living under primitive sanitary conditions in close proximity.

Strenuous measures were taken to deal with this nuisance, which were ably supported by unit commanders with the satisfactory result that the admission rate for the intestinal diseases remained creditably low.

Civil Disturbances.

25. During July troops were called out in aid of the civil power in Lahore. Troops in Sialkot, Ambala, Amritsar, Ferozepore and Multan were affected and practically all troops in hill stations had to be recalled. The troops were continuously on duty in Lahore city at the worst time of the year and under very trying conditions but hot weather precautions were taken early and there was not an undue amount of heat exhaustion or heat stroke.

Pathology.

26. *Military Laboratories.*—The work in the 1 Command, 13 District and 13 Brigade Laboratories has been increasing for a period of years. In 1935 approximately 160,000 examinations were carried out at the request of military hospitals. Clinical side room work actually carried out in hospitals has also been steadily extending in scope. In Peshawar District 24,045 specimens were examined in the hospital side rooms. Similarly the Enteric Laboratory, Kasauli, originally started as a laboratory for the detection of carriers among convalescent cases of enteric fever in British troops has now become more in the nature of a large central laboratory, to which organisms of doubtful nature are referred, and where standard agglutinable cultures and agglutinating serum is manufactured and issued to District or Brigade Laboratories. During 1935, 3,648 ccs. of agglutinating serums of fifty different

varieties; 98,100 ccs. of dilute broth suspensions for widal tests, 4,000 ccs. of concentrated suspensions for the Weil Felix test, and 1,070 ccs. of concentrated suspensions of TO, AO, and BO were issued to military laboratories. This laboratory now maintains 284 stock cultures, and the number is continually being added to annually.

The routine work in all military laboratories is mainly bacteriological and to a large extent connected with the examination of specimens from dysentery cases, from pyrexia cases, *e.g.*, suspected enteric group cases and in the last few years suspected cases of the typhus group of fevers. In addition to being a skilled bacteriologist, the military laboratory worker in India requires a knowledge of Protozoology, Helminthology, Pathology; to an increasing, though not great, extent Biochemistry, and be is liable to be asked for his opinion on entomological specimens in addition to the above. The work in District Laboratories is invariably heavy, but in the Brigade laboratories the scope of the work depends to a great extent on the enthusiasm of the medical officer in charge of the laboratory, and the staff of the hospitals in the stations in which the laboratories are located. For a keen young medical officer interested in laboratory and clinical work the charge of a Brigade laboratory is an invaluable experience, whatever branch of work he may ultimately decide to specialise in at a later date. Also before taking over charge he is given the advantage of 3 months training in a District Laboratory. The following details may be of interest as indicating the type of work mainly dealt with at the present time in the military laboratories.

Enteric group of fevers—4,397 blood cultures were sent to laboratories for examination. From these 311 enteric group bacilli were isolated. 3,346 of the blood cultures (76·1%) were proved to be sterile. The percentage of contaminations from all India was 16·6%. This is a lower figure than in previous years, and considering the long distances from which many of the specimens have to come by rail, it is considered fairly satisfactory. In certain laboratories, *e.g.*, Peshawar the percentage of contaminations was as low as 5%. Modifications of McCartney's bottles have been tried out in two or three laboratories, and it is probable that in time some modification of these will replace the present rubber capped bottles of bile salt medium supplied by most laboratories. Great differences of opinion exist as to the source of the so-called contaminating organisms. Major H. J. Bensted, M.C., R.A.M.C., is of opinion that many of these are not of extraneous origin, but were really present in the blood of the patient, while on the other hand Major F. G. A. Smyth, another laboratory worker of great experience, considers that 86% (staphylococci, coliform organisms, B. pyocyaneus) are due to skin contaminations, while 14% are due to errors in the taking of the culture or in its despatch to the laboratory. The fact that when greater efforts for sterilisation are made, the percentage of contaminations seems to be invariably reduced, supports the conclusion that the great majority at least of these non-enteric group organisms are really contaminations.

An organism similar to one reported from Jhansi last year was isolated on two occasions from the blood of a patient in Quetta. The peculiarity of these two identical strains is that while their H antigen is identical with B paratyphosus A, their "O" antigens are intermediate between those of B paratyphosus A, and the B typhosum. There is no evidence of the presence of a group phase in the H antigen.

Another bacillus of the salmonella group biochemically was isolated from the stool of a child in Poona suffering from dysentry. It was found to have

the " H " antigen type and group of the B paratyphosum B by Lt.-Col. Bridges, but the " O " antigen differs entirely from that organism and it has not been possible to classify it in any recognised antigen group.

Wilson and Blairs medium has been thoroughly tried out over a period of years, but the results have been for some reason unsatisfactory, and litmus lactose bile salt agar remains the stock media for this purpose in all the laboratories. It is hoped to try out thoroughly bacto-bismuth sulfite agar medium prepared by the Difoo Laboratories during 1936.

Excluding the examinations of convalescent cases in the Enteric Laboratory, Kasauli, 11,705 bacteriological examinations of stools were carried out. These examinations include the 20 examinations laid down for Indian cases in convalescence. 41 B. typhosus, 28 paratyphoid A, and 2 paratyphoid B (the latter organism being uncommon in India) were isolated. The results on specimens of faeces sent from outstations emulsified in 30% glycerine in 0·6% saline have never been satisfactory, but it is thought that if these examinations were carried out considerably earlier in the case than has been the custom, better results might be obtained. It should be realised also that a large number of these cases of pyrexia are eventually diagnosed as other than enteric group. 10,657 specimens of urine were examined bacteriologically also for enteric group baccilli, 69 of the specimens only giving positive results. The same remarks apply with even greater force as in the case of samples from stools particularly in the hot weather months.

Blood culture remains far the most satisfactory method of diagnosis, but it is surprising how frequently in the usual sporadic case, two or even three blood cultures taken early in the disease are found to be sterile, and the third or fourth culture from the case yields a positive result. On the other hand in small groups of cases quite frequently blood cultures seem to be positive in almost 100% of the cases. It may be possible that in a much inoculated population the bacilli may be present in the blood stream for shorter and more infrequent periods and possibly earlier in the intestine. The D. A. D. P., Quetta was able to isolate B. typhosus in the sputum of a typhoid case in 17 out of 25 occasions, the sputum being first washed in 1-200,000 brilliant green solution before plating. In view of the very frequent bronchitic or broncho-pneumonic symptoms so common in typhoid cases, particularly among Indian troops, it is hoped that this means of diagnosis will be further explored.

Complete series of (3-4 tests) widal tests were carried out in 280 suspected enteric group cases. Results with " H " agglutination tests were considered definitely diagnostic in 41·8% of the cases, *i.e.*, typhoid 69, para-typhoid A 19, paratyphoid B 29. In view of the rarity of paratyphoid B infections it is probable that some of the results as regards the latter are due to co-agglutinins rising to unduly high titres of agglutination.

The results on 226 clinically enteric group cases as regards " E " agglutination are even less helpful. In 21·1% only was the titre of " O " agglutination over 100, and in only 12% did the titre rise to over 1 in 200.

Of those cases in which " H " agglutination was negative or indefinite " O " agglutinius were also of no help in diagnosis, as in only 5 such cases did the titre rise to over 1—100.

Typhus group of fevers.—These have already been briefly discussed. 1,799 Widal tests were carried out in connection with the OX K, OX 2, OX 19 Proteus group. It is interesting that 127 cases were considered positive by the laboratory workers but only 82 were officially diagnosed clinically, this

presumably being due to the absence of symptoms—a group of 10 such cases of the OX K group on laboratory results in Rawalpindi were thus placed among the P. U. O. group by a local committee of physicians who considered the cases. In Bangalore where the disease appears to be endemic the D. A. D. P. mentions that in the majority of the cases, nine to eighteen days fever falling by lysis without distinctive symptoms, the commonest being orbital headache and vague neuralgia, occurs. In a percentage of the British cases a rash may point to the diagnosis, but in the absence of rash the clinical diagnosis of these mild cases is very difficult. In view of the above, considered along with the facts that very many of the enteric group of fevers including proved typhoid cases show a similar absence of clinical signs, that in some undoubted cases of the typhus group agglutinins do not reach a higher titre than 1—100, occasionally less, and that in a few proved typhoid cases the agglutinins to the Proteus group may reach a titre of 1—125 or higher and finally that in typhus cases agglutinins to the Proteus group may be absent or remain at a low titre until after the defervescence of pyrexia and the establishment of convalescence, it is difficult to blame clinicians for their occasional doubts as to the validity of the laboratory diagnosis on such cases.

This group of fevers particularly of the above indefinite type must be commoner among the civil populations than is realised, as a percentage among Indian troops are infected while on leave in their villages, and both D. A. D. P. Madras District, and Rawalpindi District have discovered cases among the civil population not differentiated from the numerous fevers of unknown origin common in all Indian cities and villages.

Dysentery.—20,610 bacteriological examinations were carried out during 1935 on 4,142 cases of dysentery and 3,013 cases of diarrhoea—Bacillary exudates were present microscopically in 2,505 cases (60·4 per cent.) and an indefinite exudate in 1,703 cases. The following Bacilli were isolated from the above—B. shiga 230, B schmitz 106, B. flexner V-Z series 798, Boyds strains (group A_2 and B) 392, B. sonne 292. Twice during the year the Newcastle bacillus was isolated. The commoner type,, Boyd's 88 strain, serologically identical with the above, but biochemically identical with B. flexner except in so far as two thirds of the strain ferment Dulcite late are included in Group B above.

There were 215 cases of amoebic dysentery diagnosed during the year, and also 21 mixed bacillary and amoebic infections.

29 organisms (B. flexner biochemically) could not be placed in the above groups by the present system of classification in force.

This briefly is as follows :—

(1) On the morning after the specimen has been plated out, three likely colonies are picked off the plate into lactose, and glucose and mannite peptons water and on to agar slopes and incubated.

(2) If the results next day suggest that the bacillus is possibly of the dysentery group, a preliminary slide agglutination is carried out.

(*a*) Non-mannite fermenters against Shiga and Schmitz (Indian strain 214) serum. If both are negative, against also sub-group B serum (a serum polyvalent against the late dulcite fermenting group, which includes the Newcastle bacillus, and certain other strains in India almots certainly pathogenic).

(*b*) If glucose and mannite are fermented without gas formation against—

(1) Polyvalent serum of Andrewes V-Z spectrum.

(2) Polyvalent serum for strains 103, P119 and 170. Strain 103 is identical with one of the original Flexner Y strains not included in Andrewe's classification. Strain P 119 is related to FlexnerX and occurs in Aoki's Japanese classification. Strain 170 is a new strain common as a cause of mild dysentery chiefly in the earlier months of the year.

(3) Group B serum, polyvalent for the late dulcite fermenting group noted in (*a*).

(4) B. Sonne serum polyvalent for smooth and rough varieties of B. Sonne.

A provisional report is rendered on the slide agglutination results, but in all cases a further test by Dreyer's method must be carried out. Sub-cultures of unidentifiable non-mannite fermenters are forwarded to the District Laboratory, Quetta for investigation. Sub-cultures of B. (2) (3) are forwarded with a *proforma* in duplicate to Southern Command laboratory, Poona, District Laboratories, Trimulgherry, Meerut, Rawalpindi, Quetta, whichever is the nearest, for confirmation. After identification one copy of the *proforma* is forwarded to the Medical Directorate and one to the laboratory from which the culture originated.

Cultures which do not agglutinate with one or other of the four polyvalent sera above are forwarded to the Officer in charge, Enteric Laboratory, Kasauli for further investigation.

Lt.-Colonel R. F. Bridges, R. A. M. C. has collected at the Enteric Laboratory, Kasauli 18 strains believed to be causative of bacillary dysentery, but which cannot be identified with any of the types in the Flexner or Boyd groups. Some were isolated by Major J. S. K. Boyd, R. A. M. C. in Poona, and others have been collected in the past four years.

All give the following biochemical reactions lactose,—glucose and mannite, acid no gas, saccharose—up to 7 days incubation. These he has divided serologically by indol reactions and by fermentation of dulcite into four groups; group 1, dulcite—indol—, group 2, dulcite—indol + group 3, dulcite + indol —, group 4, dulcite + indol +. Agglutinating sera are now maintained in his laboratory for each of these groups.

He has also examined Sartorius types of dysentery bacilli F. G. K. and L. in conjunction with the Boyd strains, and finds Sartorius F = type strain 103 B, Sartorius G = type strain P 119, Sartorius L = type strain 88. Sartorius K, a very rough culture, could not be typed to any known dysentery bacillus. He considers it is probably a rough type strain 88.

Lt.-Colonel R. A. Hepple, M. C., R. A. M. C. continued Lt.-Colonel D. T. M. Large's work on non-mannite fermenting organisms (not B. shiga a B. schmitz) during the year. 54 cultures were sent to him for investigation. Of these 30 fell into one or other of Large's 6 groups. The remainder were found to be either mannite fermenters, or not dysentery bacilli, and six were lost in the confusion resulting from the Quetta earthquake.

As with the specimens from Enteric group cases, difficulty is experienced with specimens from out-stations sent to the laboratory preserved in 30 per cent. glycerine in 0·6 per cent. saline. Frequently the glycerine is allowed to become on the acid side, or sufficiently fresh and well selected specimens of

mucus are not placed promptly in the glycerine mixture by the staff of hospitals sending the specimens. A. D. P. Southern Command states that his isolations from recently passed bacillary exudates in the hospital close to his laboratory is in the nature of 100 per cent. The positive isolations from all Bacillary exudates whether from out-stations or otherwise average between 60—70 per cent. in most laboratories. The percentage however varies with the interest taken by the O. C. hospital and the enthusiasm of the laboratory worker. It is reported that during the year a pathologist after series of negative results from a certain hospital demanded that bed-pans containing specimens "hot from the patient" should be brought to his laboratory. After a further series of negative results it was discovered that to comply with his wishes the subordinate staff in the hospital were heating the bed-pans over a charcoal brazier prior to coming to the laboratory with the specimen. The common occurrence of the Flexner group bacilli among the local population is shown by the fact that this bacillus invariably heads the list of those isolated during carrier examinations of prospective servants for military employ, *e.g.*, in 1935, 18 B. flexner (*plus* 4 Boyd's strains) 6 B. shigæ, 3 B sonne, and 1 B. schmitz were isolated during these routine examinations.

In this connection the large number of carriers examined annually may be pointed out. In 1935, 37,119 bacteriological examinations of stools were carried out on 11,345 carriers.

The results particularly as regards the isolation of the enteric group bacilli has always been meagre, and in recent years has become even more so. The main difficulties are in procuring suitable specimens from this uneducated class of people, who are drawn from all ends of a large station to the hospital or laboratory after an early morning dose of salts; easy in theory but very difficult in practice.

Diphtheria.—The interesting cutaneous outbreak followed by fauciae infections in the 1st East Hampshire Regiment and the eventual Schick testing and immunisation of the susceptibles in the regiment has been referred to elsewhere in this report. During the year, 6,118 throat swabs from suspected cases were examined with 353 positive results—Virulence tests were carried out with 200 of these cultures, as orders now are in force that all Diphtheroids morphologically resembling C. diphtheria from contacts or from inflammatory throat conditions not typical of Diphtheria must be tested for virulence before an official diagnosis of Diphtheria is submitted.

The value of this rule is illustrated in a small way by a small outbreak of Diphtheria in the 1st Battalion, The Gloucestershire Regiment in November 1935. The majority of the regiment were swebbed and 18 suspected carriers discovered. After virulence tests had been carried out 13 of these men were found to be carrying non virulent strains and were returned to duty. The intracutaneous method of carrying out the virulence tests with guinea pigs is practically universally employed.

Cerebrospinal fluid.—Examinations apart from specimens sent for Wassermann test, or from suspected cases of cerebrospinal fever, are not frequent. 227 specimens however were bacteriologically examined, cell counts were made on 196, chemical tests on 179, and in 34 cases Lange's Colloidal gold chloride test was carried out—Wassermann tests numbered 178.

Other examinations.—It is difficult to select particular items coming under the comprehensive heading "Other Items" in the annual laboratory reports.

as representative of the work in military laboratories, but the following may be considered as fairly so.

(1) Bacteriological examinations of water 1848, a type of work which is increasing annually in all the laboratories. Complete chemical examinations only number 181 and are only required for special reasons at rare intervals . . .	
(2) Bacteriological and chemical examinations of milk and butter = 443. The number varies greatly in laboratories according to the interest taken in this subject. In certain laboratories very few such tests were carried out.	
(3) Preparation of autogenous vaccines = 646. Work in this direction is also increasing. Not many years ago it was the custom for hospitals to obtain stock vaccines from Central Research Institute, Kasauli, rather than make use of their laboratory in this respect	
(4) Dark ground examinations for treponema pallida . .	1,244
(5) Urethral smears for presence of Gonococci . . .	686
(6) Bacteriological examinations of urine for presence of B. Coli	1,843
(7) Bacteriological examination of mineral waters . . .	336
(8) Blood grouping for blood donors:	752
(9) Estimation of Quinine in hospital stock mixtures . .	55
(10) Examination of scrapings for presence of Leishman Donovan bodies:	192
(11) Examination of sections of Dog's brains for negri bodies (including 1 cat, 1 mule, 1 monkey)	125
(12) Examination of Rats, mice, Bandicoots and squirrels in connection with plague investigation	164
(13) Bacteriological examination of pathological fluids, peritoneal, pleural, synovial, etc.	620
(14) Blood smears from dogs, horses, mules, calves, cows, buffaloes, bulls	384
(15) Identification of mosquitoes, sandflies, etc., (usually carried out at hospitals by antimalarial officer rather than in the laboratory)	277
(16) Identification of poisonous snakes	20

Friedman's test for pregnancy is becoming popular among the families and is being carried out in increasing numbers in many of the laboratories. The actual number of these tests performed during the year is not available, but in one laboratory 16 tests were made and the number was limited only by the ability of his stock of rabbits in breeding young females.

Chemical examinations.—Apart from the simpler routine tests in connection with blood, urine, faeces, these are not required to the same extent as in civil hospitals owing to the different type of population catered for. The number of such tests however is increasing and all laboratories are now equipped to carry out the more common biochemical tests.

Blood sugar tests 178, Blood urea tests 142, Vanden Berg's reaction 245, Urea concentration tests 141, fractional test meals 409, represent the main work in this connection in 1935.

Helminthology.—Taenia saginata is extremely common, possibly more so in Southern Command than elsewhere. Assistant Director of Pathology, Southern Command states that the pumps in the Poona sewage plant are frequently stopped by these worms. 205 specimens were reported. Taenia

solium much rarer, but of serious significance in view the numbers of cases of cysticercosis which have been invalided in the past five or six years, has not been discovered in Poona for four years. 24 cases of infestation with this worm were reported by other laboratories of which 8 were from Southern Command, 11 from Northern Command, 3 from Eastern and two from Burma.

The following list of ova discovered during the routine examination of faeces illustrate well the usual helminth infestations encountered.

Hymemolepis nana 74, Ankylostoma duodenale 656, Necator americanus 410 (of which 383 were from District Laboratory, Trimulgherry). Ascaris lumbricoides 459, Trichuris trichiura 300, Oxyurus vermicularis 27, Strongyloides stercoralis 4.

Examination of sections of tissues.—As in the case of the biochemical work the military population is not good field for this class of work but in certain of the bigger stations an appreciable amount has to be carried out. In all 486 pathological sections of tissues were reported on. Of these 51 were simple tumours of varying nature, 17 were sarcomas and 21 carcinomas.

In many stations civil hospitals and mission hospitals are without local resources in this respect, and much work of this nature can be carried out by M. Os. in Brigade Laboratories if they signify their willingness to do so. Such work can always be undertaken on the grounds of instructional purposes for the subordinate staff of the laboratory.

Wassermann Tests.—Five laboratories are concerned with carrying out these tests, 1 in each command in India and 1 in Burma, *i.e.*, Southern Command Laboratory, Poona, District Laboratories, Quetta, Rawalpindi, Meerut and District Laboratory in Maymyo. Specimens of blood serum and cerebrospinal fluid are forwarded by post to these laboratories from the various hospitals in their commands and in view of the trying conditions under which specimens are taken and the temperature to which the serum is subjected in transit during the hot season of the year, the results are very satisfactory. Amboceptor and Wassermann antigen are prepared and stocked in Command laboratory, Poona for issue to the other laboratories on indent. For Kahn antigen " Bacto Beef " heart is used. It has been found to be very satisfactory and keeps well.

Complement is prepared locally in the laboratories, but in the hottest months of the year, *i.e.*, in Meerut, where the temperature in the laboratory reached to 116°, it is liable to be of poor titre. By using concentration methods satisfactory tests were carried out in the hottest months. Guinea pigs may possibly have to be brought down from the hills at intervals in future years. The number of tests carried out during the year excluding control tests are given in table No. 28.

TABLE No. 28.

	Wassermann test.	Kahn test	Langes colloidal gold chloride test.
District Lab., Quetta	1,133	1,081	..
District Lab., Rawalpindi	5,866	499	24
District Lab., Meerut	5,002	36	..
Command Lab., Poona	4,375	4,299	..
District Lab., Maymyo	1,500	..	..
Total	17,876	5,915	24

The total number of specimens posted to these laboratories were 17,361. Of these the following percentages arrived "septic" in the laboratory—Meerut 0·5 per cent., Rawalpindi 0·5 per cent., Poona 3·2 per cent., Quetta 0·0 per cent., Maymyo 1·6 per cent., 103 capsules arrived broken, 0·5 per cent.

TABLE No. 29.

	Negative.	Positive.
Primary Syphilis before treatment . . .	48	747
Secondary Syphilis before treatment . .	1	221
Tertiary Syphilis before treatment . .	0	202
Test after treatment (4 laboratories) . .	4,497	768

It may be noted from the number of primary cases in which positive Wassermanns were present prior to treatment, that the microscopic diagnosis of Treponema pallida from sores is not being carried out at a sufficiently early date to allow for treatment being instituted in the great majority of cases before the Wassermann reaction has become positive. The "outstation" situation is here again the difficulty to be contended with.

Lt.-Colonel Price, D. S. O., R. A. M. C. makes the following important observations on the Kahn test. "The experience of some twenty thousand Kahn tests controlled by Wassermann test show that the Kahn test is not reliable except in the hands of an expert. The Kahn test is however always negative in a negative serum whether septic or aseptic. The Wassermann is nearly always positive (false positive) in a septic serum when the serum is really negative. The Kahn test is found to become positive in early syphilis later than the Wassermann, and to disappear after treatment after the Wassermann has ceased to be positive. The greatest accuracy is needing in preparing the saline for the Kahn test, and water doubly distilled off glass is essential. It must be neutral and not acid, as from a metal still, and though the test is simple it is not recommended as a substitute for the Wassermann.

Such a definite and authoritative statement is valuable, as owing to the difficulties in connection with the keeping of animals in extremes of temperature in India, the Kahn test being simple to carry out, and not requ ring healthy laboratory animals for its performance would appear on superficial examination to be the most suitable test. In the District laboratory, Meerut the Kahn test was found not to be satisfactory during the hottest months, as the flocculating properties of the serum were evidently being affected by the heat.

Animal inoculations.

27. Animal houses have been provided for practically all laboratories. Sheep are maintained at Southern Command Laboratory in connection with the provision of amboceptor for Wassermann tests, and Guinea pigs and rabbits in all the laboratories. Excluding the Enteric laboratory 505 Guinea pigs, 499 mice, and 41 rabbits were used for various tests. The mice were employed mainly in Peshawar in connection with research work by which it was hoped to fix the virus of sandfly fever in mouse brain tissue. The results were all negative. In Rawalpindi 181 mouse virulence tests on strains of B. typhosus forwarded from the other laboratories were carried out. The majority to date are reported to be only of moderate virulence by means of this test.

In certain stations precautions have to be taken during the very hot, or cold seasons of the year to preserve the health of the animals, sometimes very difficult. Epidemics among them have been negligible this year, but in Quetta during the cold months the rabbits annually suffer from a disease with

symptoms of purulent nasal discharge, abscesses behind the lower jaw, and congestion of lungs. The organism isolated from these cases is considered to be B. lepisepticus.

Lt.-Colonel Bridges in an endeavour to increase the agglutination titre of sera prepared for certain of the new strains of dysentery bacilli experimented with goats in lieu of rabbits. Audit objections as to cost of upkeep were met by his proving satisfactorily that, taking the yield of serum into consideration, 3·125 rabbits were the equivalent of one goat as regards expense to the state; no mean feat and one illustrating the value of a scientific outlook.

Four goats were used in the test. One yielded a good serum of high agglutinogenic properties. Two were unsatisfactory, and the fourth died during the process of immunisation, from intestinal obstruction after eating too large a branch of a tree. It is understood that 'death' was viewed as attributable to military service.

Equipment.

28. Equipment is now complete and sufficient in all laboratories and annually a few extra articles are supplied for special purposes in connection with research work. McCartney's screw-capped bottles are coming more into general use for storage of media. All district laboratories have been supplied with Frigidaires during the year.

Training.

29. Training of officers, Assistant Surgeons, and Sub-Assistant Surgeons in laboratory duties, and of the latter to groups in clinical side room work in hospitals is an important part of the work in district laboratories. Officers in charge of Brigade laboratories also train in clinical side room work.

During the year 3 medical officers were trained for Brigade laboratory appointments, 9 Assistant Surgeons (6 months course) for sub-charge of District laboratories, and 8 Sub-Assistant Surgeons (12 months course) for sub-charge of Brigade laboratories. 28 Assistant Surgeons, and 71 Sub-Assistant Surgeons were trained in clinical side room duties.

Surgery.

TABLE No. 30.

Surgical Operations—1935.

Operations.	Officers.	Other Ranks.	All Others.	Recovered.	Invalided.	Died.
1. *Nervous System—*						
Brain abscess	..	1	..	..	..	1
Stretching nerve	1	1	..	2	..	..
Epidural Injection	2	..	..	2	..	..
Ulnar Nerve Transplantation	..	1	..	1	..	..
Injection, Sciatic nerve	..	1	..	..	1	..
Orbital Nerve excision	..	..	1	1	..	..

TABLE No. 30—*contd.*

Operations.	Officers.	Other Ranks.	All Others	Recovered.	Invalided.	Died.
2. *Eye*—						
Dacryocystitis	..	..	1	1	..	..
Enucleation Eye	..	1	..	..	1	..
F. B. Removal	..	4	..	4	..	..
Others	1	..	..	1	..	..
3. *Ear, Nose and Throat*—						
Wart in Nostril Excision	..	1	..	1	..	..
Rhinitis (Septic)	..	3	..	3	..	..
Frontal Sinus (Howarth)	..	1	..	..	1	..
Incision of Membrana Tympani	..	3	..	3	..	..
Mastoid (Swartz's)	..	3	..	3	..	..
Myringotomy	..	..	1	1	..	..
Polypus Auditory Meatus Excised	..	1	..	1	..	..
Septum, Submucous, Resection	..	4	..	4	..	..
Severed Larynx (cut throat)	..	3	..	3	..	..
Deformity Nasal Septum S. M. R.	..	1	..	1	..	..
Empyema Maxillary Antrum	..	1	..	1	..	..
Mastoidectomy	..	..	1	1	..	..
Turbinectomy	..	2	..	2	..	..
Antrum Puncture and Washout	..	5	..	5	..	..
Cavernous Sinusitis	..	..	1	..	..	1
Others	..	4	30	34	..	..
4. *Circulatory and Blood forming organs*—						
Splenectomy	..	2	..	..	1	1
Varicose Veins	4	45	5	54	..	..
5. *Lymphatic system*—						
Lymphadenitis	2	16	..	17	1	..
Tropical Bubo—Aspiration	..	1	..	1	..	..
Gland Enucleation	..	3	..	3	..	..
Tubercular Glands	..	2	..	2	..	..
Adenitis Submaxillary	..	2	..	2	..	..
Adenitis Groin (Excision of Glands)	..	3	..	3	..	..
Others	..	12	10	22	..	..
6. *Ductless Glands*—						
Goitre	..	1	1	2	..	..
7. *Breast*—						
Cysto-Adenoma	..	..	2	2	..	..
Residual Abscess, Excision	..	..	1	1	..	..
Fibro-Adenoma, Excision	..	..	2	2	..	..
Mastectomy for Carcinoma	..	..	2	2	..	..
Amputation	..	1*	1	2	..	..
Mastitis	..	1	1	2	..	..
8. *Respiratory*—						
Tracheotomy	..	..	2	2	..	..
Empyema	1	6	3	8	1	1
Aspiration Pleural Effusion	..	1	..	1	..	..
Thoracotomy (Resection Rib)	..	8	..	8	..	..
Artificial Pneumothorax	..	1	..	1	..	..
9. *Teeth and gums*—						
Teeth Extraction	2	54	24	80	..	..
Alveolar abscess	..	6	..	6	..	..

*For hypertrophy.

TABLE No. 30—*contd.*

Operations.	Officers.	Other Ranks.	All Others	Recovered.	Invalided.	Died.
10. *Digestive*—						
Appendicostomy	..	..	2	2	..	..
Appendicectomy	37	326	54	409	2	6
Hernia	9	91	11	111	..	..
Cholecystectomy	1	9	6	14	2	..
Laparotomy	..	8	7	11	2	2*
Ulcer, Duodenal and Gastric	2	6	..	3	2	3
Gall Stones	..	..	2	2	..	..
Repair Abdominal Wall	..	1	..	1	..	..
Intraperitoneal Abscess	..	2	..	2	..	..
Gastro-Enterostomy	1	..	..	1	..	..
Sub-Phrenic Abscess	..	1	..	..	..	1
General Peritonitis	..	1	..	1	..	..
Faecal Fistula Closure	..	1	..	1	..	..
Liver Abscess	..	5	..	4	..	1
Tonsillectomy	3	55	86	144	..	..
Adenoidectomy	1	5	12	18	..	..
Haemorrhoids	14	79	1	94	..	..
Fistula in Ano	1	8	1	10	..	..
Fissure in Ano	2	5	2	9	..	..
Ischio Rectal Abscess	1	8	..	9	..	..
Pelvis Abscess per Rectum	..	3	..	3	..	..
Prolapse Repair	1	..	..	1	..	..
Sigmoidoscopy	2	4	1	7	..	..
Haematoma	..	3	1	4	..	..
Anal Papillomata	1	6	..	7	..	..
Anal Warts	..	4	..	4	..	..
Quinsy	..	1	..	1	..	..
Oesophagoscopy	..	..	1	1	..	..
Chronic Pyelitis	..	..	1	1	..	..
Enterostomy	1	..	..	..	..	1
Perforated Intestine (enteric)	..	1	..	..	..	1
Intestinal Obstruction	..	3	..	2	..	1
Rupture Intestine	..	1	..	..	..	1
Calculi of Wharton's Duct	..	2	..	*2	..	..
Proctoscopy	..	3	..	3	..	..
Others	6	31	16	48	3	2
11. *Generative (male)*—						
Undescended Testicle	..	1	..	1	..	..
Varicocele	..	44	..	44	..	..
Circumcision	1	45	18	64	..	..
Dorsal Slit Prepuce	..	1	..	1	..	..
Biopsy, Testicle	1	..	..	..	1	..
Paraphimosis	..	2	..	2	..	..
Phimosis	..	17	3	20	..	..
Hydrocele	..	14	..	14	..	..
Castration	..	1	..	1	..	..
Orchidectomy	2	7	1	7	3	..
Tumour Cord	..	1	..	1	..	..
Urethra Stricture	..	6	..	6	..	..
Periurethral Abscess	..	1	..	1	..	..
Urethral Fistula	..	1	..	1	..	..
Epididymectomy	..	1	..	1	..	..
Others	..	9	5	14	..	..

*1 Pulmonary Embolus.

TABLE No. 30—*contd.*

Operations.	Officers.	Other Ranks.	All Others.	Recovered.	Invalided.	Died.
12. *Generative (Female)*—						
Haematocele	..	..	2	2	..	..
Retroversion of Uterus and Appendicectomy and Overian Cyst	..	..	1	..	..	1
Retroversion Uterus	..	..	1	1	..	..
Colpotomy	..	..	1	1	..	..
Colpoperineorrhaphy	..	..	1	1	..	..
Fixation Uterus	..	..	1	1	..	..
Cæsarean Section	..	..	4	3	..	1
Cystocele	..	..	1	1	..	..
Hysterectomy	..	..	2	2	..	..
Ectopic Gestation	..	..	3	2	..	1
Endometritis, Curettage	..	..	1	1	..	..
Salpingo-Oophorectomy	..	..	2	2	..	..
Pelvis Dilatation and Curettage	..	..	2	2	..	..
Vesico Vaginal Fistula Repair Operation	..	..	1	1	..	..
Others	..	..	8	8	..	..
13. *Bones, Joints, Muscles, Fasciae and Tendons*—						
Fractures — Manipulated	11	80	13	104	..	..
Fractures — Plated or Wired	1	18	2	20	1	..
Fractures — Pin Extension	1	11	2	13	1	..
Fractures — Others	9	70	9	84	4	..
Osteomyelitis	..	4	10	12	2	..
Osteochondritis	..	5	..	4	1	..
Osteoclasis	..	2	1	3	..	..
Sequestrectomy	..	12	1	13	..	..
Excision of Metatarsal Spur	..	1	..	1	..	..
Removal of Plates	1	6	1	8	..	..
Biopsy Sarcoma	..	1	..	1	..	..
Calcanean Spur	1	..	..	1	..	..
Periostitis	..	2	..	2	..	..
Necrosis	..	1	..	1	..	..
Sinus Bone Scraping	..	2	..	2	..	..
Removal Distal End 4th Metacarpal Bone	..	1	..	1	..	..
Exostosis Astragalus Excision	..	5	..	5	..	..
Exostosis Clavicle	..	1	..	1	..	..
Exostosis Tibia and Big Toe	..	2	..	2	..	..
Osteitis Tibia	..	1	..	1	..	..
Dislocation	1	23	3	27	..	..
Aspiration	1	25	1	25	2	..
Hammehr Toe	..	20	..	19	1	..
Reduction Dislocation	5	20	..	25	..	..
F. B. Removal	..	2	..	2	..	..
Manipulations, Joints	12	76	2	88	2	..

TABLE No. 30—*contd.*

Operations.	Officers.	Other Ranks.	All Others.	Recovered.	Invalided.	Died.
13. *Bones Joints Muscles Fasciae and Tendons contd—*						
Synovitis	..	2	..	2	..	..
Semilunar Cartilage	6	71	..	76	1	..
Intra-articular Cartilage	..	3	..	3	..	..
Arthrotomy and Meniscectomy	7	94	..	100	1	..
Hallux Valgus	..	6	1	7	..	..
Hallux Rigidus	..	1	..	1	..	..
Rupture of Adhesions	..	9	..	9	..	..
Bursitis	..	9	..	9	..	..
Disarticulation Finger	..	1	..	..	1	..
Tenotomy	..	4	2	6	..	..
Suture Tendon	1	6	..	7	..	..
Ganglion	..	8	..	8	..	..
Hernia Gastrocnemiius Muscle	..	1	..	1	..	..
Dupuytren Contracture	1	1	..	2	..	..
Lengthening, tendons	..	1	1	2	..	..
Tendo-Lysis	1	..	..	1	..	..
Excision	..	2	..	2	..	..
Excision of Calcaneo-scaphoid Capsule	..	..	1	1	..	..
Others	4	20	3	24	3	..
14. *Amputations—*						
Toe	..	5	..	5	..	..
Leg	..	1	..	..	1	..
Terminal Phalanx of Finger	..	2	..	2	..	..
Finger	..	4	..	3	1*	..
Others	..	5	1	4	2	..
15. *Skin and subcutaneous tissues—*						
I. A. T.	39	259	22	318	..	2†
Onychia	..	8	..	8	..	..
Keloid	..	1	..	1	..	..
Carbuncle	..	..	2	2	..	..
Finger Nail Excision	..	1	..	1	..	..
Ingrowing toe Nails	1	54	3	58	..	..
Avulsion of Nails	..	23	..	23	..	..
Paronychia	..	6	..	6	..	..
Skin Graft	1	5	..	5	1	..
Sores	..	6	..	6	..	..
Warts	..	5	..	5	..	..
Scars	..	3	..	3	..	..
Plastic Operations	..	2	..	2	..	..
Cellulitis Neck, Opening and Drainage	..	2	..	2	..	..
Others	..	22	..	21	1	..
16. *Urinary—*						
Pyelolithotomy	..	..	1	1	..	..
Perinephric Abscess	..	6	1	6	..	1
Tumour Kidney	..	1	..	1	..	..

*G. S. W. self inflicted.
†Death due to Septicaemia.

TABLE No. 30—*concld.*

Operations.	Officers.	Other Ranks.	All Others.	Recovered.	Invalided.	Died.
16. Urinary—*contd.*						
Renal Fixation (Floating Kidney)	..	1	..	1	..	..
Nephrectomy	..	4	1	3	..	2
Nephrolithotomy	..	1	..	1	..	..
Cystoscopy	2	32	1	32	3	..
Ureterotomy for Calculus	..	1	..	1	..	..
Nephropexy	1	..	..	1	..	..
17. *Injuries*—						
Wounds	6	44	2	52	..	..
Contusion	..	1	..	1	..	..
Gunshot Wounds	5	18	..	17	3	3
18. *Tumours*—						
Lipoma, abdominal wall	..	1	..	1	..	..
Malignant	..	2	1	1	2	..
Non-malignant	3	22	3	28	..	..
Excision	..	1	1	1	1	..
Rodent ulcer	..	1	..	1	..	..
19. *Cysts*—						
Sebaceous	2	104	2	108	..	..
Bronchial	..	1	..	1	..	..
Dental	..	2	..	2	..	..
Bursal	..	4	..	4	..	..
Meibomian	..	2	..	2	..	..
Bartholins	..	..	1	1	..	..
Ovarian	..	..	2	2	..	..
Thyro-Lingual	..	1	..	1	..	..
Dermoid	..	1	..	1	..	..
Epididymis	..	2	..	2	..	..
Others	1	3	..	4	..	..
20. *Parasites*—						
Cysticercosis	..	1	..	1	..	..
Guinea-worm	..	1	..	1	..	..
Myiasis foet	..	2	..	2	..	..
21. *Miscellaneous*—						
Foreign bodies removed	2	18	5	25	..	..
Blood transfusion	1	16	1	17	..	..
Minor operation	..	59	10	69	..	..
Examinations	1	6	..	7	..	..

Anaesthetics.

Chloroform Open	54
Aether	171
Chloroform and Aether Open	649
Nitrous Oxide	160
Nitrous Oxide and Aether	9
Avertin	1
Phenolaine	9
Percaine	22
Stovaine	10
Ethyl Chloride	48
Ethyl Chloride and Aether	23
Evipan	22
Evipan and Aether	3
Spinal	6
Novocaine (Local)	147

Special Report of Surgical Work during Quetta Earthquake, May 31st et seq. 1935.—A detailed list of the Surgical work performed following the Quetta disaster is impossible except in the most approximate terms.

At the British Military Hospital, Quetta, twenty-four Major Operations were performed—with three deaths.

At the Indian Military Hospital approximately 400 Major Operations were performed—the number of post operative deaths is not known. Certain striking lessons were learnt and certain facts became evident—these will be set down categorically.

I. *Organization.*—(*a*) The division of the large tent hospital into Special areas, *viz.*,

Area A—for cases of fractured spine and pelvis, retentions of urine, etc.

Area B—for female cases of whatever kind.

Area C—for closed fractures and severe wounds. ..

Area D—for compound fractures.

Area O—operation and recovery tents.

Each area was staffed with its own team of medical officers, nurses, orderlies, followers and voluntary workers and was run as a self-contained unit. This arrangement greatly facilitated the work of the officer commanding and 'Specialist officers' and also made the task of evacuation much more simple.

(*b*) *Transport.*—The use of Plaster of Paris casts for practically all cases of fracture to facilitate their transport. This method was found to be far superior both in comfort, safety and ease of handling to the usual cumbersome "Splint" method. In addition the plaster of paris was applied just as quickly as were the ordinary splints.

(*c*) *Surgical Team Work.*—The undoubted value of this was again emphasised.

II. *Clinicl Features.*—(*a*) The routine use in all cases of antitetanus and anti-gas gangrene sera. The effectiveness of this was demonstrated by the occurrence of only four cases of tetanus and one case of gas gangrene (all amongst Indians). It is also by no means certain that prophylactic doses had been given to these people as omissions were inevitable.

(*b*) In spite of the lack of adequate sterilizaion facilities for dressings (Antiseptic precautions were employed in the operation theatres throughout —towels soaked in 1/20 carbolic acid, etc.), wounds healed remarkably satisfactorily. The procedure adopted was to wash thoroughly with soap and water, remove all badly damaged tissue and dress with acriflavine or Eusol, combined with glycerine or methylated spirit. The use of iodine was discouraged as its effectiveness in Baluchistan, at any rate, had not been proved by previous experiences.

(c) The satisfactory end results of fracture cases seen later in spite of the fact that they had received little or no treatment apart from the original manipulation and fixation in plaster of paris (for purposes of transportation).

(*d*) The death of most cases of abdominal and spinal injuries—chiefly owing to their arriving late for treatment.

Cases of Special Interest.

1. *Intestinal Obstruction.*—Operation was performed for cure of sub-acute appendicitis, retroversion and right sided ovarian cyst. The patient's condition after the operation and until the next day at noon was perfect. Then she was quite suddenly seized with moderate epigastric pain, and vomited. Stomach washes, but not medicinal treatment, relieved her temporarily. There was no distension, and the bowels were obstinately constipated but passed a little flatus. Decision to explore for intestinal obstruction (not due to paralytic ileus) was made 48 hours after onset of vomiting. This was done under spinal anaesthesia. About three feet of small gut were tightly impacted in the pelvis. This gut was distended and blue when extracted and the points of entry and exit were sharply demarcated. It was viable. Caecostomy was performed (after Grey Turner). Four hours later the patient's condition was quite dramatically improved and she asked for a bed-pan. Four hours later still about 9 P. M. she collapsed suddenly and died next day at 8 A.M. Examination P. V. after the collapse showed that there was no evidence of re-impaction in the pelvis, though regurgitant vomiting recommenced.

2. *Intestinal Obstruction.*—An officer was admitted with rapidly increasing intestinal obstruction. X-rays showed the obstruction to be in the descending colon. A caecostomy was performed to relieve the distension and ten days later a laparotomy was performed. An Annular constricting growth was found in the middle of descending colon. The growth with a portion of bowel each side was resected and an end-to-end anastomosis performed. A blood transfusion was then given. The patient made a good rapid recovery from the operation. The caecostomy was closed four weeks later. Ten days after this a large lump was felt in the left hypochondrium. A laparatomy was performed and an inopenable hard growth about the size of a fist was felt. He was immediately transferred to Bombay, where deep X-ray was available. After a few treatments he was sent to England, when the lump had disappeared. This officer is now on duty as a riding instructor at the Equitation School at Saugor. Microscopic examination of the slide in India reported "a mixed cell sarcoma", but apparently the report at home did not confirm malignancy. Clinically from the rapidity of the symptoms the case was very suggestive of malignancy.

3. *Foreign Bodies in Intestine.*—One patient a prisoner undergoing detention swallowed on three successive occasions, the following articles. *First admission to hospital.*—Two two-inch nails, ten tunic buttons, one Gillette razor blade in small pieces, six large hooks and eyes, twelve blunt and sharp pins, four buttons.

Second admission.—Twelve large and small tunic buttons and broken pieces of a safety razor blade.

Third admission.—Thirty-three short lengths of twisted wire.

The above mentioned patient was treated with Normacol and passed all the objects without difficulty or untoward symptoms.

4. *Foreign Body in Rectum.*—A round 14 oz. bottle was in the rectum of a man. The anus was so patulous that under low spinal Anaesthesia low midwifery forceps could be applied over the shoulder of the bottle. However, delivery could not be effected till the left levator ani muscle had been cut across. Wound was sutured and healed with perfect control of bowel.

5. *Rupture of the Kidney.*—A girl aged 11. She was kicked by her horse in the right abdomen and on observation there was a rising pulse rate and increase of pain. Initially there was haematuria which had almost disappeared in 24 hours. Tenderness was general and more marked on the right side of the abdomen and right loin. Laparatomy was decided upon and a small rupture of the liver sutured. There was marked subserous haemorrhage around the ascending colon which was contused. In the right paracolic fossa a large haematoma was seen shining through the peritoneum. It was opened and the kidney was found to be torn completely into two halves. The vessels and ureter were tied and the kidney removed. The kidney fossa was drained. On the 6th day the stomach became dilated and there was copious vomiting, while the pulse and temperature rose. The wound was re-opened and an abscess found in the kidney fossa, which despite drainage had apparently become infected from the overlying contused ascending colon. The extra-peritoneal portion of the duodenum (2nd and 3rd parts) which is normally in relation with the R. Kidney was traversing this abscess. It was red, inflammed and dilated, being in a state of paralytic ileus ; this was the cause of the dilatation of the stomach and the vomiting. The abscess was drained after which recovery was rapid. This case was treated in British Families Hospital, Nowshera.

6. *Liver abscess.*—A patient with clinical symptoms of liver abscess and a history of dysentery in Egypt two years previously was admitted to the British Military Hospital, Trimulgherry off the troop train from Bombay. A full course of emetine was tried without any response. Aspiration of the right lobe of the liver yielded thick pus. Two inches of the tenth rib were resected and the abscess cavity drained by the transpleural route. The pus on laboratory examination revealed a pure culture of staphylococcus. Recovery slow but uneventful. X-Ray examination revealed a chronic cholecystitis and it is possible that the abscess was secondary to a gall bladder infection.

7. *Branchiogenic Carcinoma.*—(Lateral cervical Neoplasm). This occurred in the rare supraclavicular position, and was of cystic type with malignant degeneration of squamous carcinoma.

Operation.—Excision *en masse* from posterior triangle, includng a wide area of skin and a portion of stermo-mastoid muscle. The main area of malignancy appeared to be anteriorly, invading stermo-mastoid muscle, and skin. The deep portion was separated through cellular tissue planes from floor of triangle and from carotid sheath medically. No lymphatic metastases.

Total capacity about 1¼ times a tennis ball.

Disposal.—Invalided to allow palliative deep X-Ray Therapy.

In view of its rarity the tissue is being submitted for independent pathological study for confirmation of diagnosis with a view to publication.

Radiology.

32. TABLE No. 31.

No. of patients examined		British	13,152
		Indian	8,593
		Civilian	1,702
No. and nature of examinations carried out.	Bones and Joints	Injury	14,651
		Disease	2,067
		Sinuses	861
	Teeth		993
	Lungs		2,412
	Heart		152
	Gastro intestinal		575
	Liver and gall bladder		370
	Urinary tract		785
	Genital tract		84
	Miscellaneous		427
	Foreign body		61
	Pregnancy		67
Number in which a contrast medium was used and nature of medium.		Barium	645
		Shadacol	124
		Uro-selectan B and lipiodol	99
Miscellaneous information		No. of ordinary films used	34,070
		No. of dental films	3,535
		No. of exposures	47,607
		No. of prints	114
		No. of screen examinations	863

Dental treatment.

33. Dental officers unanimously express their appreciation of the helpful assistance of officers commanding hospitals and the valued co-operation received from medical officers. X-Ray facilities have enabled many obscure oral conditions to be diagnosed speedily with a consequent celerity of the alleviation of pain and cure.

A number of officers report the success of "Evipan" as an anaesthetic for multiple extractions of teeth and advocate it as a valuable addition to the anaesthetics for dental operations.

All dental officers are agreed that the provision of electric dental engines would considerably increase the efficiency of the dental services in this country. The cost of this item scarcely allows of purchase from contingent allowances of dental officers.

Figures relative to dental treatment in India are given in Table No. 32.

Table No. 32.

India.

	Men inspected.		Men selected for treatment.		Men whose treatment has been completed			Anaesthetics.		Teeth conserved.								
	Trained soldiers.	Recruits.	Trained soldiers.	Recruits.	Trained soldiers.	Recruits.	Teeth extracted.	Local.	General.	Without root treatment.	With root treatment.	Scalings completed.	Gingivitis or stomatitis treatments completed.	Supplied with new dentures.	Dentures supplied.	Dentures remodelled.	Dentures repaired.	Appliances for jaw injuries fitted.
British other ranks . . .	33,936	...	20,584	...	18,939	...	15,185	13,278	194	39,315	77	3,498	551	455	534	313	169	18
Officers	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Families of B. O. Rs. . . .	2,044	...	2,036	...	1,963	...	3,183	1,503	376	1,562	6	219	33	6	9	...	...	...
Royal Air Force other ranks .	1,206	...	657	...	635	...	285	251	6	1,430	6	106	15	15	19	18	9	...
Officers	51	...	51	...	43	...	2	2	...	137	...	16	1	...	...	...	...	...
Royal Navy Ratings . . .	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Indian Other Ranks . . .	140	...	138	...	124	...	253	174	7	24	1	11	8	11	18	...	1	4
Total .	37,377	...	23,466	...	21,704	...	18,908	15,208	583	42,468	90	3,850	608	487	580	331	179	22

SECTION II.

ON THE HEALTH OF THE INDIAN ARMY FOR THE YEAR 1935.

(From Director, Medical Services in India.)

General.

34. TABLE A.

	Average strength.	Admissions. No.	Admissions. Ratio per 1,000.	Deaths. No.	Deaths. Ratio per 1,000.	Invalids sent to United Kingdom. No.	Invalids sent to United Kingdom. Ratio per 1,000.	Invalids discharged in India. No.	Invalids discharged in India. Ratio per 1,000.	Average constantly sick. No.	Average constantly sick. Ratio per 1,000.
Officers	2,053	712	346·8	15	7·31	14	6·82	...	...	24·16	11·77
Indian Ranks	116,984	49,452	422·7	252	2·15	...	...	648	5·54	1,837·30	15·71
Followers	26,055	7,893	302·9	95	3·65	...	...	120	4·61	279·64	10·73
Others*	...	1,859	...	14	...	...	...	74	....	...	....

The health statistics of officers and Indian ranks for the quinquennial period 1925-29 with those for 1930, 1931, 1932, 1933, 1934 and 1935 are given separately in the following table for purposes of comparison.

TABLE B.

Period.	Ratio per 1,000. Admissions. King's Commissioned officers.	Admissions. Indian ranks.	Invalids. King's Commissioned officers.	Invalids. Indian ranks.	Deaths. King's Commissioned officers.	Deaths. Indian ranks.
1925-29	498·0	385·6	5·22	10·80	4·74	3·43
1930	313·7	417·9	16·42	6·23	5·47	3·16
1931	367·4	451·3	14·73	8·73	5·52	2·96
1932	321·8	429·8	11·95	6·47	6·90	2·52
1933	345·5	510·9	16·41	5·68	4·69	2·39
1934	335·2	456·8	2·86	5·62	4·29	2·10
1935	346·8	422·7	6·82	5·54	7·31	2·15

Officers.

35. The admission rate of officers sick in hospital for 1935 is 346·8 per 1,000 of strength as compared with 335·2 in 1934.

* Includes Reservists, Indian Territorial Forces, Royal Indian Marine, Indian States, Forces, R. A F., Civilians and Pensioners.

The principal causes of sickness were :—

TABLE C.

Diseases.	Actuals.	Ratio per 1,000.	Increase or decrease as compared with 1934. Increase.	Decrease.
Local injuries	104	50·7	4·4	..
Digestive diseases other than tonsillitis, appendicitis and diarrhœa	93	45·3	..	2·9
Malaria	82	39·9	2·2	..
Minor septic diseases	56	27·3	6·3	..
Dysentery	36	17·5	..	5·4
Ear and nose	33	16·1	..	0·1
Tonsillitis	32	15·6	..	1·6
Respiratory diseases	30	14·6	3·2	..
Diseases of bones, joints, muscles, fasciae and bursae	29	14·1	0·3	..
Diarrhoea	25	12·2	1·7	..

There were 15 deaths of which 4 were due to injuries, and 9 to other diseases (septicaemia 2, malaria, poliomyelitis, encephalo-myelitis, fatty degeneration of myocardium, agranulocytosis, angina-pectoris and carcinoma Pylorus 1 each).

Soldiers.

36. 49,452 or 422·7 per 1,000 of the strength, were admitted to hospital, compared with 456·8 in 1934. There is thus a decrease of 34·1 per 1,000 compared with the 1934 figures.

The principal causes of admissions to hospital were :—

TABLE D.

Diseases.	Actuals.	Ratio per 1,000.	Increase or decrease as compared with 1934. Increase.	Decrease
Malaria	14,728	125·9	..	30·6
Local injuries	6,209	53·1	4·1	..
Minor septic diseases	4,127	35·3	0·7	..
Pharyngitis	1,926	16·5	..	5·1
Dysentery	1,424	12·2	..	1·7
Bronchitis	1,320	11·3	..	3·0
Venereal diseases	1,186	10·1	0·5	..
Scabies	1,126	9·6	..	1·5
Sandfly fever	882	7·5	..	0·8
Ankylostomiasis	846	7·2	4·0	..
Mumps	799	6·8	..	1·3
Conjunctivitis	752	6·4	..	0·1
Common cold	675	5·8	1·0	..

TABLE D—*Contd.*

Diseases.	Actuals.	Ratio per 1000.	Increase or decrease as compared with 1934. Increase.	Decrease.
Diarrhœa	651	5·6	..	0·7
Influenza	635	5·4	..	5·1
Tonsillitis	609	5·2	..	0·2
Pneumonia (lobar and lobular)	576	4·9	..	1·1
Indigestion	428	3·7	..	0·1
Dengue	395	3·4	0·9	..
Constipation	377	3·2	..	..
Synovitis	361	3·1	..	0·1
Coryza	339	2·9	1·2	..
Otitis media	317	2·7	0·3	..
Dermatitis	302	2·6	..	0·4
Jaundice	295	2·5	..	0·2
Myalgia	292	2·5	0·3	..
Rhinitis	278	2·4	..	4·0
Ring worm	285	2·4	0·1	..
Measles	260	2·2	0·1	..
Eczema	237	2·0	..	0·3
Trachoma	237	2·0	0·5	..
Pleurisy	221	1·9	0·1	..
Pulmonary tuberculosis	219	1·9	0·1	..
Dracontiasis	202	1·7	..	0·2
Appendicitis	189	1·6	..	..
Piles	177	1·5	..	0·2
Enteric group of fevers	166	1·4	..	0·5
Chicken-pox	148	1·3	0·3	..
Keratitis ulcerative	136	1·2	..	0·2
Colic	136	1·2	..	..

The death rate shows a n increase of 0·05 per 1,000 from 2·10 in 1934 to 2·15 in 1935.

The main causes of deaths were :—

TABLE E.

Diseases.	Actuals.	Ratio per 1,000.	Increase or decrease as compared with 1934. Increase.	Decrease.
Pneumonia (Lobar and lobular)	60	0·51	0·02	..
Local injuries	39	0·33	..	0·04
General injuries	25	0·21	0·16	..
Pulmonary tuberculosis	15	0·13	0·06	..
Circulatory diseases	14	0·12	..	..
Digestive diseases	13	0·11	..	0·11
Enteric group of fevers	13	0·11	..	0·02
Malaria	9	0·08	0·03	..
Nervous diseases	8	0·07	..	..
Meningococcal infection	7	0·06	..	0·07
Tuberculosis (other than pulmonary)	7	0·06	0·02	..
Septicaemia	4	0·03	0·01	..
Poisons	4	0·03	0·02	..

Invalids.—There were 648 or 5·54 per 1,000 invalids discharged during the y ear, this is 0·08 per 1,000 less than in 1934.

TABLE F.

Principal causes of invaliding.

Diseases.	Actuals.	Ratio per 1,000.	Increase or decrease as compared with 1934. Increase.	Decrease.
Pulmonary tuberculosis	194	1·66	0·05	..
Injuries	100	0·85	0·06	..
Diseases of the nervous system	40	0·34	..	..
Diseases of the eye	38	0·32	..	0·02
Diseases of bones, joints, muscles, fasciae and bursae	34	0·29	..	0·10
Respiratory diseases	33	0·28	0·04	..
Mental diseases	30	0·26	..	0·08
Circulatory diseases	27	0·23	..	0·04
Digestive diseases	26	0·22	0·09	..
Other tubercular diseases	25	0·21	..	0·05
Diseases of ear and nose	19	0·16	0·01	..
Leprosy	13	0·11	0·06	..
Diseases of urinary organs	9	0·08	0·05	..
Venereal diseases	7	0·06	..	..
Diseases of blood	6	0·05	..	0·01
Diseases of lymphatic system	5	0·04	..	0·01

The average number constantly sick in hospital was 1837·30 or 15·71 per 1,000 of the strength, compared with 16·14 in 1934.

The average sick time to each soilder was 5·73 days, and the average duration of each case 13·56 days; the corresponding figures were 5·97 and 12·89 in 1934.

144,262 men, or 1233·2 per 1,000 of the strength, were treated as out patients compared with 1325·6 per 1,000 in 1934. The average daily number under treatment in barracks was 2029·79 or 17·35 per 1,000 compared with 18·32 per 1,000 in 1934.

The combined ratio constantly sick in hospital and under treatment as out-patients was 33·06 per 1,000 of the strength, compared with 34·46 in 1934.

The above represents a loss of 670,614 men days in hospital and 740,873 men days treated in barracks or a total loss of 1,411,487 men days in the year.

TABLE

Table showing admission and death ratios per 1,000 of the strength for all causes and certain Stations with *total* admission ratios, all causes, higher than all-India.

Stations.		Bannu.	Wana.	Delhi.	Jhelum.	Dehra Dun.	Fort Sandeman.	Nowshera.	Quetta.	All India.
Strength		2,024	3,198	2,038	2,254	2,734	2,111	2,95	7,015	116,984
All causes	A.	841·8	729·5	571·8	535·9	478·1	465·7	438·5	428·5	422·7
	D.	2·96	2·81	1·92	1·77	1·46	1·89	2·37	2·57	2·15
	Av.C.S.	23·87	20·71	17·13	15·81	25·31	10·46	15·30	19·42	15·71
Analysis of the above *total* admission rates.										
Malaria	A.	155·1	436·5	135·5	239·1	105·7	242·5	98·5	180·8	125·9
	D.	...	0·31	0·96	...	..	0·47	...	...	0·08
Sand-fly fever	A.	50·9	0·06	...	9·3	1·1	7·1	4·4	0·1	7·5
	D.	..	..	..	..	..	..	..	..	..
Enteric group	A.	2·0	0·3	0·5	1·3	1·1	0·5	3·0	1·7	1·4
	D.	..	..	...	0·44	..	...	...	0·14	0·11
Dysentery	A.	16·4	7·9	12·0	20·9	12·9	2·4	12·2	14·3	12·2
	D.	..	..	..	..	..	..	..	..	0·02
Diarrhœa	A.	10·9	10·9	6·2	4·4	..	11·4	8·1	3·1	5·6
	D.	..	..	..	..	..	..	..	..	..
Influenza	A.	3·0	0·9	..	..	1·1	..	6·1	8·0	5·4
	D.	..	..	..	..	0·37	..	...	0·14	0·03
Pneumonia lobar & lobular	A.	5·9	5·0	7·2	6·2	7·7	5·7	3·7	6·3	4·9
	D.	0·49	0·94	0·48	...	0·37	0·95	0·34	1·00	0·51
Venereal diseases	A.	10·4	6·6	14·8	5·8	16·5	3·8	6·4	6·4	10·1
	D.	...	..	..	..	..	..	..	..	0·01
Minor septic diseases	A.	67·7	32·5	63·7	19·5	43.5	21·8	31·5	17·5	35·3
	D.	..	..	..	..	..	..	..	..	0·01
Local injuries	A.	84·5	71·6	85·2	39·9	81·6	49·7	84·0	36·9	53·1
	D.	..	0·6	0·48	..	..	0·47	0·68	0·43	0·33
Heat-stroke	A.	..	..	..	..	..	..	..	..	0·0
	D.	..	..	..	..	..	..	..	..	0·01
Heat-exhaustion	A.	...	...	..	..	..	..	0·7	..	0·1
	D.	....	..	..	..	..	..	..	..	..
Ankylostomiasis	A.	12·4	4·4	...	6·7	16·8	1·4	6·1	6·9	7·2
	D.	..	..	..	..	..	..	..	..	..
Pulmonary tuberculosis	A.	5·4	2·2	2·9	3·1	2·9	1·9	2·0	1·0	1·9
	D.	..	0·31	..	..	..	..	0·68	..	0·13

G.

important diseases for stations with a strength of 2,000 and upwards compared with all-India.

Stations with *total* admission ratios, all causes, lower than all-India.

Bangalore.	Abbottabad.	Trimulgherry.	Peshawar.	Rawalpindi.	Lahore.	Meerut.	Kohat.	Jubbulpore.	Ambala.	Sialkot.	Poona.	Raxmak.
2,598	4,000	3,117	5,186	4,240	2,336	2,342	4,178	2,183	2,291	2,032	3,816	4,657
406·9	406·5	390·8	389·1	376·2	370·7	359·0	358·5	357·3	347·4	341·5	324·4	311·6
2·69	3·50	2·57	1·16	1·42	3·0	3·84	1·91	1·37	1·31	2·46	1·05	2·58
19·80	12·04	13·79	14·34	16·03	14·70	18·05	12·37	13·90	14·62	15·48	13·40	14·97

Analysis of the above *total* admission rates.

26 9	68·0	18·9	148·1	84·9	69·8	91·4	143·8	72·4	90·4	32·0	88·6	57·8
...	..	...	...	...	...	...	...	...	...	...	...	0·21
...	..	...	15·2	14·9	6·8	0·4	10·8	...	1·3	5·4	..	...
...	...	...	...	...	...	...	...	...	...	...	...	..
0·4	0·7	1·6	1·6	2·0	3·0	3·0	0·8	0·5	0·8	...	0·9	1·9
0·38	0·25	0·32	0·19	...	...	0·85	...	...	...	...	...	0·43
9·7	3·4	21·2	21·4	19·8	9·0	20·2	16·9	24·8	7·0	3·9	13·2	6·4
...	0·25	...	...	...	...	...	...	...	...	...	...	..
9·2	9·0	1·9	6·4	5·9	9·0	3·0	8·6	6·9	4·4	9·8	2·1	5·2
...	...	...	...	...	...	...	...	...	...	...	...	...
27·3	...	2·2	0·2	..	8·1	0·9	...	...	0·9	8·4	2·1	0·6
...	...	...	...	...	...	...	...	...	...	...	...	...
3·5	5·0	2·9	6 4	4·7	7·7	10·3	3·8	0·9	2·2	4·9	5·5	5·4
0·38	0·75	0·96	0·39	0·47	1·71	0·85	0·72	...	0·44	1·48	0·52	1·07
14·6	3·7	6·1	10·4	8·3	5·6	14·5	6·9	2·3	5·2	8·9	11·8	10·5
...	...	...	...	...	...	...	...	...	...	...	...	...
83·9	53·7	28·6	22·0	28·1	59·5	25·6	26·8	49·9	36·2	36·4	81·4	27·3
...	0·25	...	...	...	...	...	...	...	...	...	...	...
91·2	50·7	75·1	33·6	46·5	67·6	59·8	31·4	60·5	51·5	82·7	8·7	57·1
...	...	0·64	0·19	...	...	0·85	0·48	0·48	...	0·98	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	0·3	...
...	...	...	..	...	...	...	...	...	...	...	...	...
0·4	6·0	112·6	4·4	6·8	2·1	1·3	1·7	6·0	12·2	0·5	2·1	4·3
...	...	...	...	...	...	...	...	...	...	...	...	..
0·8	2·75	0·6	1·3	1·4	1·3	1·3	1·9	1·3	2·6	1·5	1 1	1·5
...	0·50	..	...	...	...	...	...	...	0·44	...	...	..

The statistics as a whole show that the health of the Indian Army was very good.

Admissions to hospital for Indian ranks were 34·1 per 1,000 less than last year and are the lowest since 1930. The invaliding rate and the death rate are practically the same.

PRINCIPAL DISEASES AFFECTING THE INDIAN ARMY.

Cerebro-spinal Meningitis.

37. The incidence during the year was as follows :—

	Cases.	Deaths.	Case mortality per cent.
Indian Troops (Regular) . .	19	7	37
Indian Troops (Territorial) . .	6	1	17
Followers	9	6	67
Pupils, K. G. R. I. M. School, Ajmer	4	1	25
	38	15	39

Comparative figures for the last five years will be found in Table No. 4 on page 6 in the Section of the report dealing with British Troops.

The seasonal and geographical distribution of the total Indian cases were :—

January—	
Jhelum	1
Abbottabad	4
Karachi	1
Rawalpindi	1
Nasirabad	1
Bannu	1
Meerut	6
Total .	15
February—	
Abbottabad	2
Jullundur	2
Campbellpore	1
Wana	1
Razmak	1
Comilla	1
Total .	8

March—	
Lahore	1
Jullundur	1
Bangalore	1
Total	3
May—	
K. G. R. I. M. School, Ajmer	4
Total	4
June—	
Quetta.	1
Total	1
July—	
Quetta.	1
Total	1
October—	
Jhansi	1
Lahore	1
Peshawar	1
Total	3
December—	
Sialkot	1
Cawnpore	1
Meerut	1
Total	3
GRAND TOTAL	38

The age incidence was chiefly between 18 and 20 years and only 2 cases occurred in persons over 30 years of age. Out of the 19 cases in Indian Regular units 12 were recruits.

Dengue.

38. 395 cases were admitted for this disease giving a ratio of 3·4 per 1,000 compared with 2·5 in 1934. The stations principally affected were :—

	Actuals.	Ratio per 1,000.		Actuals.	Ratio per 1,000.
Madras	209	398·9			
Mandalay.	76	90·3	Mingaladon	64	84·1

No cases occurred in Karachi and this is of interest in view of the importance placed on prevention of yellow fever entering Karachi Airport from Africa.

Typhus Fever.

39. There were 45 cases among Indian ranks and the distribution and type are given below :—

TABLE H.

Command and Stations.	OX 19	OX 2	OX K	OX M	Total
Northern Command—					
Rawalpindi	4	1	..	..	5
Lahore	1	..	..	..	1
Western Command—					
Quetta	4	..	..	..	4
Chaman	1	..	..	..	1
Eastern Command—					
Bareilly	1	..	..	..	1
Meerut	..	1	..	..	1
Fatehgarh	1	..	..	..	1
Calcutta	1	..	..	..	1
Southern Command—					
Bangalore	9	1	..	..	10
Secunderabad	3	3	1	1	8
Jubbulpore	..	3	1	..	4
Aurangabad	1	..	..	..	1
Poona	..	2	..	..	2
Baroda	..	1	..	..	1
Madras	1	..	..	..	1
Burma—					
Maymyo	..	..	3	..	3
	27	12	5	1	45

Except in Southern Command where cases occurred all the year round the seasonal incidence was chiefly during the monsoon season.

This disease is dealt with in greater detail in the Section of the report on British Troops.

Sandfly Fever.

40. There were 882 cases in 1935 compared with 970 in 1934, thus giving ratios per 1,000 of 7·5 and 8·3 respectively.

The incidence was chiefly among the troops in Peshawar District, Waziristan District, Kohat District, Rawalpindi District, Lahore District, Zhob (I) Brigade Area and Lucknow District with ratios per 1,000 of 29·7, 11·5, 9·0, 8·1, 7·5, 7·2, and 6·4 respectively.

Dysentery, Diarrhœa and Colitis.

41. TABLE I.

Years.	Dysentery.		Diarrhœa.		Colitis.		Total.	
	Actuals.	Ratio per 1,000.	Actuals.	Ratio per 1,000.	Actuals.	Ratio per 1,000.	Actuals.	Ratio per 1,000.
1933	1,804	15·3	933	7·9	30	0·3	2,767	23·5
1934	1,632	13·9	742	6·3	28	0·2	2,402	20·5
1935	1,424	12·2	651	5·6	21	0·2	2,096	17·9

The admissions for different types of dysentery are given below and the percentage of each type remains very much the same as in 1934.

	Actual admissions.	Percentage.
Dysentery protozoal	50	3·51
Dysentery bacillary (proved bacteriologically)	592	41·57
Dysentery bacillary exudate (no dysentery bacilli isolated)	407	28·58
Dysentery clinical	375	26·33

Only two deaths occurred in the 1,424 dysentery cases, thus giving a case mortality of 0·14 per cent. In 1934 there were 6 deaths in 1,632 cases and a case mortality of 0·36 per cent. The distribution of dysentery by Commands is given below :—

TABLE J.

	Dysentery. (Ratio per 1,000).			
	Amoebic.	Bacillary (bacteriologically proven).	Bacillary exudate.	Clinical.
Northern Command	0·3	4·0	3·4	4·1
Western Command	0·4	3·3	1·6	4·2
Eastern Command	0·6	5·5	2·8	2·6
Southern Command	0·2	7·5	4·7	0·6
Burma District	2·3	7·8	6·9	3·3

Enteric Group of Fevers.

42. The comparative incidence of the enteric group of fevers among British and Indian Troops during the past three years is given in the Section of the report dealing with British Troops where these diseases are dealt with at length.

Among Indian Troops in 1935 the admission rate was 1·4 per 1,000 as compared with 1·9 per 1,000 in 1934, there being actually 58 less cases in 1935 than in 1934.

Out of the total of 166 cases there were 13 deaths representing a case mortality of 7·8 per cent. In 1934 there were 15 deaths in 224 cases giving a case mortality of 6·7 per cent.

The inoculation state of the troops is satisfactory, the figures for the last half yearly inoculation in September being :—

TABLE K.

	British officers.	Indian other ranks.	Followers.
Strength	1,758	115,387	23,728
Protected	1,679	114,060	23,560
Unprotected percentage . . .	79	1,327	168
Protected	95·5	98·8	99·2

The relative incidence, deaths and case mortality among protected and unprotected I. O. Rs. were :—

TABLE L.

	Actuals.		Ratio per 1,000		Case mortality per cent.
	Cases.	Deaths.	Cases.	Deaths.	
Protected	151	11	1·30	0·09	7·28
Unprotected	16	2	8·56	1·07	12·50

Malaria.

43. There were 14,728 cases of malaria with 9 deaths in 1935 compared with 18,353 cases and 6 deaths in 1934. The ratios per 1,000 during the last five years were :—

TABLE M.

	1931.	1932.	1933.	1934.	1935.
Admissions . .	149·4	145·1	212·2	156·5	125·9
Deaths . . .	0·10	0·10	0·06	0·05	0·08
Invalids . . .	0·08	0·07	0·05	0·06	0 03

The following table shows the incidence of the various types of malaria by Commands :—

TABLE N.

Commands & Independent Districts.		Admissions and Deaths. Actuals.				Ratio per 1,000.			
		B. T.	M. T.	Qtn.	Clin.	B. T.	M. T.	Qtn.	Clin.
Northern	A.	4,418	2,352	9	724	80·0	42·6	0·2	13·1
	D.	..	2	..	..	..	0·04	..	..
Western .	A.	1,630	559	1	154	120·9	41·5	0·1	11·4
	D.	..	2	..	..	..	0·15	..	..
Eastern .	A.	1,607	672	10	291	61·3	25·6	0·4	11·1
	D.	..	1	..	..	..	0·04	..	..
Southern.	A.	902	742	16	23	42·1	34·6	0·7	1·1
	D.	..	..	..	..	..	..	..	..
Burma .	A.	165	201	3	34	53·9	65·7	1·0	11·1
	D.	..	1	..	..	..	0·33	..	..
All India	A.	8,722	4,526	39	1,226	74·6	38·7	0·3	10·5
	D.	..	6	..	..	..	0·05	..	..

The stations with an average annual strength of over 1,000 in which malaria admissions exceeded 100 per 1,000 were :—

Wana	436·5	Jullundur	153·6
Mardan	252·4	Peshawar	148·1
Fort Sandeman	243·5	Kohat	143·8
Jhelum	239·1	Delhi	135·5
Lansdowne	187·6	Chaman	122·4
Maymyo	182·4	Ferozepore	107·7
Quetta	180·8	Dehra Dun	105·7
Bannu	155·1		

The stations with an average strength of over 500 and under 1,000 in which malaria admissions exceeded 100 per 1,000 were :—

Neemuch	368·3	Nasirabad	164·2
Loralai	276·1	Mir Ali	154·6
Shagai	274·2	Malakand	154·1
Thal	254·7	Almora	143·6
Jhansi	247·1	Muttra	134·9
Bombay	219·0	Comilla	126·0
Dharamsala	209·2	Mandalay	121·1
Chittagong	206·3	Mhow	115·2
Ahmedabad	205·6	Manzai	113·6
Fatehgarh	187·9	Said Pur	109·2
Bakloh	174·4	Saugar	104·6

During the Mohmand Operations 1935 the malaria admissions for Indian troops and followers were 119·9 and 133·4 per 1,000 of strength respectively.

Treatment and prevention of malaria are dealt with in the Section of the report on British Troops.

Pneumonia.

44. TABLE O.

Years.	Admissions. Actuals.	Admissions. Ratio per 1,000.	Deaths. Actuals.	Deaths. Ratio per 1,000.
1931	1,078	8·7	132	1·06
1932	961	7·9	97	0·80
1933	730	6·2	89	0·76
1934	704	6·0	58	0·49
1935	576	4·9	60	0·51

Of the 576 cases admitted 472 were lobar and 104 lobular in type. The case mortality of the two types were 9·96 and 12·50 per cent. respectively.

The incidence by Commands was :—

	Ratio per 1,000.
Northern Command	5·1
Western ,,	5·5
Eastern ,,	5·3
Southern ,,	3·1
Burma District	4·9

Pyrexia of uncertain origin.

45. 11 cases were included under this head giving a ratio of 0·1 per 1,000 as in 1934.

Small-pox.

46. There were 22 admissions with 3 deaths giving a ratio per 1,000 of 0·2 and 0·03 respectively. This is practically the same as in 1934.

Ten of the cases occurred during March, April and May and the other cases were spread evenly over the remaining months. The high incidence in the U. P. noted among British Troops was not seen among Indian troops of which only 8 out of the 22 cases occurred in the U. P.

Tuberculosis.

47. Pulmonary tuberculosis caused 219 admissions with 15 deaths and 194 invalids giving ratios per 1,000 of 1·9, 0·13 and 1·6, respectively.

There were 56 admissions for tuberculosis of other organs with 8 deaths and 25 invalids giving ratios per 1,000 of 0·5, 0·07 and 0·21 respectively. Tuberculosis of various abdominal organs produced 11 admissions.

Venereal Diseases.

48. This group accounted for 1,186 admissions, giving a ratio per 1,000 of 10·1 which was 0·5 per 1,000 more than in 1934.

TABLE P.

Diseases.	Admissions.		Percentage.	
	1933.	1934.	Increase.	Decrease.
Gonorrhœa	491	543	10·59	..
Syphilis	409	433	5·87	..
Soft chancre	229	210	..	8·30

Other Diseases due to Infection or Infestation.

49. There were 5,501 admissions under this heading. The most important diseases in this group were :—

Scabies	1,126	Rheumatic fever	96
Ankylostomiasis	846	Intestinal taeniasis	89
Mumps	799	Oriental sore	67
Common Cold	675	Filariasis	62
Influenza	335	Typhus fever	45
Measles	260	Kala azar	19
Jaundice catarrhal	218	Leprosy	10
Dracontiasis	202	Septicæmia	8
Chicken Pox	148	Relapsing fever	6
Ascariasis	126	Diphtheria	3

Diseases of the Circulatory System.

50. Circulatory diseases caused 102 admissions to hospital of which the majority were D. A. H. The ratio per 1,000 for admissions was 0·9 which was the same as in 1934.

There were 13 deaths from this group of diseases giving a ratio per 1,000 of 0·11, the same as in 1934.

Diseases of Respiratory System.

51. The admissions for diseases of the respiratory system exclusive of pneumonia and tuberculosis, totalled 1,745 giving a ratio of 14·9 per 1,000. Of these 1,320 or 75 per cent. were due to bronchitis. There were 2 deaths and 33 cases were invalided. The ratio per 1,000 for bronchitis was 11·3 which was 3 per 1,000 less than in 1934.

The other important diseases in the group were pleurisy 221, laryngitis 106 and asthma 76.

Diseases of the Digestive System.

52. There were 5,217 admissions for the diseases of the digestive system with 13 deaths and 26 invalids, the ratios per 1,000 being admissions 44·6, deaths 0·11 and invalids 0·22 respectively.

The most important diseases in this group were :—

TABLE Q.

	Admissions.	Deaths.	Invalids.
Pharyngitis	1,926	..	..
Diarrhœa	651	..	..
Tonsillitis	609	..	3
Indigestion	428	..	1
Constipation	377	..	..
Appendicitis	189	3	3
Hæmorrhoids	177	..	..
Colic	136	..	..
Gastritis	101	1	1
Jaundice	77	..	..
Hepatitis	60	..	2

In addition to the above there were 111 cases of hernia with 1 death and 6 invalids.

Minor Septic Diseases.

53. This group produced 4,127 admissions giving a ratio of 35·3 per 1,000 of strength. Included in the group were :—

Cellulitis	2,701
Boils	692
Abscess	411
Inflammation of lymphatic glands and vessels	166

Local Injuries.

54. There were 6,209 admissions in this group. The ratio per 1, 000 was 53·1 compared with 49·0 in 1934.

Followers.

55. The total admissions 7,893 or 302·9 per 1,000 of the strength compared with 287·6 in 1934.

The table below gives figures for certain endemic and infectious diseases amongst followers :—

TABLE R.

	Admissions.			Admissions.	
	Actuals.	Ratio per 1,000.		Actuals.	Ratio per 1,000.
Malaria . .	2,778	106·6	Sandfly fever .	110	4·2
Venereal diseases*	269	10·3	Scabies . .	105	4·0
Pneumonia .	195	7·5	Pulmonary tuberculosis.	42	1·6
Dysentery .	192	7·4			
Influenza . .	127	4·9	Dengue .	40	1·5
Diarrhœa . .	110	4·2	Enteric group of fevers.	22	0·8
			Small-pox . .	8	0·3

There were 95 deaths with a ratio of 3·65 per 1,000 of strength.

The principal causes of death were :—

TABLE S.

	Actuals.	Ratio per 1,000.		Actuals.	Ratio per 1,000.
Pneumonia . . .	32	1·23	Other respiratory diseases	6	0·23
Digestive diseases . .	10	0·38	Injuries . . .	4	0·15
Other infectious diseases	8	0·31	Poisons . . .	3	0·12
Nervous diseases . .	7	0·27	Pulmonary tuberculosis	2	0·08
Circulatory diseases .	7	0·27			

Recruiting.

56. The total number of recruits examined at Recruiting Centres in the year ending the 31st March 1936, was 24,747 ; of these 8,907 were rejected, a percentage of 35·99. The percentage of rejections for the year 1934-35 was 35·55.

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*Gonorrhœa 117, Syphilis 108 and Soft chancre 44.

The principal causes of rejection of recruits for the year ending 31st March 1936 were as follows :—

Disability.	No. of men rejected as unfit for enrolment out of 24,747 presented at recruiting centres only.		No. of recruits found unfit during training out of 13,126 enrolled (11,823 recruits enrolled at recruiting centres and 1,303 at unit headquarters).	
	Actuals.	Percentage.	Actuals.	Percentage.
Malaria (enlarged spleen)	648	2·62	6	0·05
Tuberculosis (pulmonary)	176	0·71	9	0·07
Tuberculosis (other organs)	7	0·03	..	..
Venereal diseases	419	1·69	5	0·04
Other diseases due to infection	105	0·42	8	0·06
Diseases of the nervous system	62	0·25	20	0·15
Defective vision	455	1·84	13	0·10
Trachoma	691	2·79	4	0·03
Other eye affections	248	1·00	10	0·08
Otitis media	437	1·77	4	0·03
Defective hearing	19	0·08	8	0·06
Other ear diseases	245	0·99	1	0·01
Diseases of nose and throat	161	0·65	4	0·03
Valvular disease of the heart	392	1·58	..	..
Disordered action of heart	734	2·97	..	..
Varicose veins	269	1·09	2	0·02
Hæmorrhoids	215	0·87	..	..
Varicocele	210	0·85	..	..
Other diseases of circulatory system	26	0·11	..	..
Anæmia	193	0·78	3	0·02
Goitre	353	1·43	1	0·01
Respiratory diseases excluding tuberculosis	31	0·13	4	0·03
Pyorrhœa	275	1·11	..	..
Loss or decay of teeth	41	0·17	..	..
Hernia	363	1.47	2	0·02
Other diseases of digestive system	17	0·07	4	0·03
Ankylosis of joints	65	0·26	3	0·02
Flat foot	47	0·19	14	0·11
Knock knee	84	0·34	..	..
Curvature of spine	232	0·94	1	0·01
Other deformities	345	1·39	35	0·27
Skin diseases	297	1·20	4	0·03
Poor physique	199	0·80	21	0·16
Other causes	846	3·42	34	0·26
Total	8,907	35·99	220	1·68

N.B.—The figures in columns 4 and 5, and in the heading, are in respect of the following, only :—

Cavalry.
Infantry (excluding Gurkha Battalions).
Artillery.
Signals.
Machine Gun Platoons of British Infantry.

Military Operations.

57. *Indian Other Ranks.*

Locality and period.	Loe Agra. 16-2-35—13-6-35.		Mohmand. 16-8-35—4-11-35.	
Average strength.	3,132		9,940	
Admission to hospital.	Actuals.	Ratio per 1,000.	Actuals.	Ratio per 1,000.
All causes	349	111·43	2,184	219·72
Principal causes of admissions :—				
Malaria	19	6·07	1,192	119·92
Dysentery	22	7·02	48	4·83
Minor Septic diseases	30	12·77	119	11·97
Digestive diseases	59	18·84	268	26·96
Local injuries excluding G. S. W.	77	24·58	228	22·94
G. S. W.	13	4·15	86	8·65

The higher sick rate in the Mohmand operations may be attributed to the high incidence of malaria, due to the operations being carried out during the malaria season in country notorious for malaria. Further remarks on these operations have been included in the Section of this report dealing with British Troops.

Quetta Earthquake.

58. This has already been commented on in the Section on British Troops.

APPENDICES.

SECTION I.

BRITISH TROOPS.

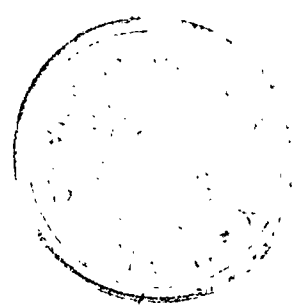

TABLE A.

STATIONS BY COMMANDS AND INDEPENDENT DISTRICTS.

Stations.	Height above M.S. level in feet.	Authority for height.	Points of reference.
Northern Command.			
Abbottabad	4,010	S.D.	Map.
Ambala	902	,,	S.B.M.
Amritsar	754	,,	,,
Bannu	1,250	,,	Map.
Barian Camp and Khyragali	7,133	I.B.	..
Campbellpore	1,180	S.D.	Map.
Cherat	4,546	,,	,,
Dagshai	6,087	,,	,,
Dalhousie Convalescent Depot	7,687	,,	,,
Dera Ismail Khan	568	,,	S.B.M.
Ferozepore	649	,,	,,
Gharial	6,811	S.G.	,,
Jhelum	762	S.D.	,,
Jullundur Cantt.	771	,,	B.M.
Jutogh	6,370	,,	Map.
Kalabagh & Baragali	7,963	,,	,,
Kalabagh & Mari Indus	682	,,	,,
Kasauli Convalescent Depot	6,050	,,	..
Kohat	1,725	,,	Map.
Khanspur and Ghora Dhaka	7,721	,,	,,
Kuldana	7,049	S.G.	,,
Lahore Cantt. and Fort	706	S.D.	S.B.M.
Landikotal	3,509	,,	Map.
Manzai	1,650	,,	,,
Mir Ali	2,240	S.G.	V.G.L.
Multan	404	S.D.	S.B.M.
Murree Convalescent Depot	7,073	,,	Map.
Nowshera (Rly. Station)	966	,,	B.M.
Peshawar	1,152	,,	S.B.M.
Rawalpindi	1,689	,,	,,
Razmak	6,556	,,	Map.
Risalpur	1,014	,,	B.M.
Sialkot	829	,,	,,
Solon	5,078	,,	,,
Sargodha	615	,,	,,
Sabathu	4,000	,,	Map.
Wana	4,530	S. G.	V. G. L.
Western Command.			
Fort Sandeman	4,600	S.D.	Map.
Hyderabad	96	,,	S.B.M.
Karachi (Holy Trinity Church)	28	,,	,,
Loralai	4,699	,,	Map.
Quetta	5,510	,,	S.B.M
Eastern Command.			
Agra (Fort)	525	S.D.	S.B.M.
Allahabad & Fort	314	,,	,,
Bareilly	563	,,	,,
Barrackpore	24	,,	,,
Benares	256	,,	,,
Cawnpore	407	,,	B.M.
Chakrata	6,885	,,	Map.
Dacca	20	M.D.	..
Dehra Dun	2,232	S.D.	S.B.M.
Delhi	757	,,	,,
Dinapore	170	,,	Church.
Fatehgarh	467	,,	,,
Fort William	17	S.G.	..
Fyzabad	330	S.D.	S.B.M.
Jhansi	849	,,	,,
Landour Convalescent Depot	7,528	,,	..
Lansdowne	5,823	,,	Map.
Lebong	6,000	,,	..
Lucknow Kalubir's	383	,,	B.M.
Meerut	737	,,	S.B.M.
Muttra	560	,,	,,
Naini Tal	6,400	,,	,,
Ranikhet and Chaubattia	5,980 / 6,942	,, S.G.	.. ..
Roorkee	879	S.D.	S.B.M.
Southern Command.			
Ahmedabad	162	S.D.	S.B.M.
Ahmednagar	2,180	,,	Map.
Bangalore	3,002	,,	S.B.M.
Baroda	114	,,	B. M.
Belgaum	2,523	,,	S.B.M.
Colaba (Bombay Town Hall)	20	,,	,,
Deolali	1,894	,,	,,
Jubbulpore	1,320	,,	,,
Kamptee (Rly. Station)	940	,,	B.M.
Madras (Obsy.)	250	,,	,,
Malapuram (Rly. Station)	1,380	,,	,,
Mhow	1,887	,,	
Mount Abu Sanatorium	3,836	,,	,,
Nasirabad	1,461	,,	Map.
Pachmarhi	3,490	,,	,,
Poona	1,867	,,	S.B.M.
Purandhar	4,560	,,	..
Saugor	1,755	,,	S.B.M.
Secunderabad	1,776	,,	,,
Wellington (Stn. Hospital)	5,800	,,	Map.
Burma Ind. District.			
Mandalay (Fort Dufferin)	246	S.D.	Map.
Maymyo	3,508	,,	,,
Mingaladon	118	,,	,,
Port Blair (Tindal Obsy.)	9	,,	B.M.

S.D. = Survey Department.
S.B.M. = Standard Bench Mark.
B.M. = G. T. Bench Mark.
S.G. = Surveyor-General of India.
M.D. = Meteorological Department.
V.G.L. = Village ground level.

Map. = Heights taken from Topo. Maps.
I.B. = Intelligence Branch of the Division of the Chief of the Staff.

TABLE I.

WARRANT OFFICERS, N. C. Os. AND MEN.

INDIA.

Table showing the average strength, admissions into hospital, deaths, numbers invalided and constantly sick, during the year 1935, with ratios per 1,000 of the strength.

Diseases.	Actuals.				Ratio per 1,000.			
	Admissions.	Deaths.	Invalids sent home.	Average number constantly sick.	Admissions.	Deaths.	Invalids sent home.	Constantly sick.
Average strength 52,646.								
SPECIFIC DISEASES DUE TO INFECTION OR INFESTATION.								
Common cold	342	..	..	5·97	6·5	..	..	0·11
Diphtheria	66	..	..	5·09	1·3	..	..	0·10
Dysentery	1,536	1	4	67·16	29·2	0·02	0·08	1·28
Enteric fevers (inclusive of typhoid, para. A, B and C and enteric group.)	106	9	1	14·38	2·0	0·17	0·02	0·27
Erysipelas	8	..	..	0·38	0·2	..	..	0·01
Influenza	560	..	..	15·83	10·6	..	..	0·30
Malaria	2,955	4	..	107·66	56·1	0·08	..	2·04
Measles	19	..	..	1·08	0·4	..	..	0·02
Meningococcal infection	1	..	..	0·90	0·0	..	..	0·00

TABLE I—*contd.*

Diseases.	Actuals. Admissions.	Deaths.	Invalids sent home.	Average number constantly sick.	Ratio per 1,000. Admissions.	Deaths.	Invalids sent home.	Constantly sick.
Average strength 52,646.								
SPECIFIC DISEASES DUE TO INFECTION OR INFESTATION—*contd.*								
Mumps	24	..	..	1·08	0·5	..	..	0·02
Pneumonia	222	21	1	21·31	4·2	0·40	0·02	0·40
Pyrexia of uncertain origin	37	..	..	2·72	0·7	..	..	0·05
Rheumatic fever	68	1	4	7·26	1·3	0·02	0·08	0·14
Sandfly fever	1,922	..	..	39·53	36·5	..	..	0·75
Scarlet fever	3	..	..	0·32	0·1	..	..	0·01
Small-pox	3	..	..	0·43	0·1	..	..	0·01
Tuberculosis — Pulmonary.	54	3	35	19·84	1·0	0·06	0·66	0·38
Tuberculosis — Other	15	..	9	4·50	0·3	..	0·17	0·09
Venereal diseases — Gonorrhœa	1,357	..	1	175·57	25·8	..	0·02	3·33
Venereal diseases — Soft chancre	357	..	..	36·33	6·8	..	..	0·69
Venereal diseases — Syphilis	315	1	1	27·34	6·0	0·02	0·02	0·52
Venereal diseases — Other V. D.	13	..	..	0·96	0·2	..	..	0·02
Other diseases due to infection	673	3	2	28 98	12·8	0·06	0·04	0·55
Diseases due to infestation by Metazoan parasites — Scabies	75	..	—	2·06	1·4	..	..	0·04
Diseases due to infestation by Metazoan parasites — Other diseases	193	..	5	5 37	3·7	..	0·09	0·10
OTHER DISEASES CLASSIFIED UNDER SYSTEMS.								
Diseases of the nervous system	404	4	27	23·63	7·7	0·08	0·51	0·45
Mental diseases	173	..	53	36·73	3·3	..	1·01	0·70
Diseases of the eye	190	..	14	10·51	3·6	..	0·27	0·20
Diseases of the ear and nose	1,147	1	15	38·30	21·8	0·02	0·28	0·73

Diseases of the :—									
Circulatory system.	*Valvular diseases of the heart.*	24	2	10	3·26	0·5	0·04	0·19	0·06
	Disordered action of the heart	125	1	11	6·87	2·4	0·02	0·21	0·13
	Other diseases	85	2	6	6·79	1·6	0·04	0·11	0·13
Blood and blood forming organs		273	1	3	16·46	5·2	0·02	0·06	0·31
Ductless or endocrine glands		22	..	6	2·30	0·4	..	0·11	0·04
Breast		11	..	..	0·25	0·2	..	..	0·00
Respiratory system.	*Larynx and trachea*	61	..	1	1·68	1·2	..	0·02	0·03
	Bronchi and bronchioles	817	1	10	30·39	15·5	0·02	0·19	0·58
	Other diseases	117	..	8	9·51	2·2	..	0·15	0·18
Teeth and gums		148	..	..	3·83	2·8	..	..	0·07
Digestive system.	Inflammation of tonsils	1,494	..	..	37·45	28·4	..	..	0·71
	Inflammation of pharynx	420	..	..	9·20	8·0	..	..	0·17
	Inflammation of stomach	307	..	1	12·87	5·8	..	0·02	0·24
	Gastric ulcer	19	2	3	2·16	0·4	0·04	0·06	0·04
	Duodenal ulcer	27	1	8	4·18	0·5	0·02	0·15	0·08
	Liver	67	1	2	5·29	1·3	0·02	0·04	0·10
	Other diseases	2,680	8	8	109·85	50·9	0·15	0·15	2·09
Diseases due to disorders of nutrition or of metabolism		14	4	1	0·75	0·3	0·08	0·02	0·01
Diseases of the :—									
Generative system		655	..	..	32·91	12·4	..	..	0·63
Bones, joints, muscles, fasciæ and bursæ		1,266	1	47	68·39	24·3	0·02	0·89	1·30
Areolar tissue		2,809	..	..	93·36	53·4	..	..	1·77
Skin		1,571	..	6	67·63	29·8	..	0·11	1·28
Urinary system		285	4	17	21·44	5·4	0·08	0·32	0·41
Injuries	General	137	19	3	4·37	2·6	0·36	0·06	0·08
	Local	3,275	33	30	140·74	62·2	0·63	0·57	2·67
	In action	..	..	..	..	..	..	..	..
Tumours and cysts		132	4	10	7·45	2·5	0·08	0·19	0·14
Poisons		11	1	..	0·27	0·2	0·02	..	0·01
No appreciable disease		149	..	..	5·69	2·8	..	..	0·11
*Suicides		..	(9)	..	..	..	(0·17)	..	..
	Total	29,858	134	363	1,407·76	567·1	2·55	6·90	26·74

* The figures against "Suicides" having already been shown under the heading of the injury, etc., which caused death, are not included in the total.

TABLE II.

WARRANT OFFICERS, N. C. Os. AND MEN—*contd.*

NORTHERN COMMAND.

Table showing the average strength, admissions into hospital, deaths and constantly sick during the year 1935 with ratios per 1,000 of the strength.

Diseases.	Actuals.			Ratio per 1,000.		
	Admissions.	Deaths.	Average number constantly sick.	Admissions.	Deaths.	Constantly sick.
Average strength 16,683.						
SPECIFIC DISEASES DUE TO INFECTION OR INFESTATION.						
Common cold	96	..	1·74	5·8	..	0·10
Diphtheria	39	..	2·72	2·3	..	0·16
Dysentery	480	..	22·37	28·8	..	1·34
Enteric fever (inclusive of typhoid, para A, B and C and enteric group)	48	5	6·33	2·9	0·30	0·38
Erysipelas	6	..	0·33	0·4	..	0·02
Influenza	134	..	3·77	8·0	..	0·23
Malaria	956	..	35·07	57·3	..	2·10
Measles	4	..	0·19	0 2	..	0·01
Meningococcal infection	1	..	0·09	0·1	..	0·01
Mumps	9	..	0·35	0·5	..	0·02
Pneumonia	86	7	8·32	5·2	0·42	0·50
Pyrexia of uncertain origin	17	..	1·36	1·0	..	0·08
Rheumatic fever	20	..	2·17	1·2	..	0·13
Sandfly fever	1,387	..	27·65	83·1	..	1·66

Scarlet fever	..	..	..	..	..	..
Small-pox	..	..	..	..	..	..
Tuberculosis — Pulmonary	12	..	3·50	0·7	..	0·21
Tuberculosis — Other	4	..	1·42	0·2	..	0·09
Venereal diseases — Gonorrhœa	332	..	49·43	19·9	..	2·96
Venereal diseases — Soft chancre	58	..	7·10	3·5	..	0·43
Venereal diseases — Syphilis	61	..	6·15	3·7	..	0·37
Venereal diseases — Other V. D.	3	..	0·17	0·2	..	0·01
Other diseases due to infection	180	..	10·34	10·8	..	0·62
Diseases due to infestation by Metazoan parasites — Scabies	26	..	0·70	1·6	..	0·04
Diseases due to infestation by Metazoan parasites — Other diseases	55	..	1·62	3·3	..	0·10

OTHER DISEASES CLASSIFIED UNDER SYSTEMS.

Diseases of the nervous system	114	3	5·91	6·8	0·18	0·35
Mental diseases	36	..	8·21	2·2	..	0·49
Diseases of the eye	69	..	4·92	4·1	..	0·29
Diseases of the ear and nose	398	1	15·53	23·9	0·06	0·93
Diseases of the Circulatory system — Valvular disease of the heart	6	..	0·57	0·4	..	0·03
Diseases of the Circulatory system — Disordered action of the heart	49	..	2·44	2·9	..	0·15
Diseases of the Circulatory system — Other diseases	19	..	2·16	1·1	..	0·13
Diseases of blood and blood forming organs	67	1	3·89	4·0	0·06	0·23
Diseases of ductless or endocrine glands	11	..	1·07	0·7	..	0·06
Diseases of the breast	5	..	0·09	0·3	..	0·01
Diseases of the Respiratory system — Larynx and trachea	21	..	0·56	1·5	..	0·03
Diseases of the Respiratory system — Bronchi and bronchioles	253	1	9·47	15·2	0·06	0·57
Diseases of the Respiratory system — Other diseases	34	..	3·00	2·0	..	0·18
Diseases of the teeth and gums	36	..	0·73	2·2	..	0·04
Diseases of the Digestive system — Inflammation of tonsils	513	..	12·94	30·7	..	0·78
Diseases of the Digestive system — Inflammation of pharynx	117	..	2·65	7·0	..	0·16
Diseases of the Digestive system — Inflammation of stomach	140	..	6·35	8·4	..	0·38
Diseases of the Digestive system — Gastric ulcer	11	..	1·29	0·7	..	0·08
Diseases of the Digestive system — Duodenal ulcer	11	..	1·34	0·7	..	0·08
Diseases of the Digestive system — Liver diseases	21	..	1·56	1·3	..	0·09
Diseases of the Digestive system — Other diseases	881	2	34·90	52·8	0·12	2·09

TABLE II—*contd.*

Diseases.	Actuals.			Ratio per 1,000.		
	Admissions.	Deaths.	Average number constantly sick.	Admissions.	Deaths.	Constantly sick.
Average strength 16,683.						
Diseases due to disorders of nutrition or of metabolism	6	1	0·15	0·4	0·06	0·01
Diseases of the generative system	174	..	8·00	10·4	..	0·48
Diseases of bones, joints, muscles, fasciæ and bursæ	430	1	20·56	25·8	0·06	1·23
Diseases of the areolar tissue	953	..	29·56	57·1	..	1·77
Diseases of the skin	456	..	19·05	27·3	..	1·14
Diseases of the urinary system	93	3	7·43	5·6	0·18	0·45
Injuries—General	65	11	2·51	3·9	0·66	0·15
Injuries—Local	1,106	14	45·40	66·3	0·84	2·72
Injuries—In action	..	..	..	..	..	..
Tumours and cysts	41	1	2·13	2·5	0·06	0·13
Poisons	1	..	0·01	0·1	..	0·00
No appreciable disease	44	..	1·96	2·6	..	0·12
*Suicides	..	(2)	..	..	(0·12)	..
Total	10,195	51	449·28	611·1	3·06	26·93

* The figures against "Suicides" having already been shown under the heading of the injury, etc., which caused death, are not included in the total.

TABLE III.

WARRANT OFFICERS, N. C. Os. AND MEN—*contd.*

WESTERN COMMAND.

Table showing the Average Strength, Admissions into Hospital, Deaths, and Constantly Sick, during the year 1935, with the Ratios per 1,000 of the Strength.

Diseases. Average strength 3,908.	Actuals.			Ratio per 1,000.		
	Admissions.	Deaths.	Average number constantly sick.	Admissions.	Deaths.	Constantly sick.
SPECIFIC DISEASES DUE TO INFECTION OR INFESTATION.						
Common cold	62	..	0·96	15·9	..	0·25
Diphtheria	..	..	..	..	..	..
Dysentery	145	..	6·35	37·1	..	1·62
Enteric fever (inclusive of typhoid, para. A, B, and C and enteric group)	5	..	0·98	1·3	..	0·25
Erysipelas	..	..	..	..	..	..
Influenza	44	..	1·26	11·3	..	0·32
Malaria	532	2	13·89	136·1	0·51	3·55
Measles	1	..	0·05	0·3	..	0·01
Meningococcal infection	..	..	..	..	..	..
Mumps	2	..	0·06	0·5	..	0·02
Pneumonia	13	1	1·38	3·3	0·26	0·35
Pyrexia of uncertain origin	..	..	..	..	..	..
Rheumatic fever	12	..	0·86	3·1	..	0·22
Sandfly fever	25	..	0·74	6·4	..	0·19

TABLE III—*contd.*

Diseases. Average Strength 3,908.	Actuals.			Ratio per 1,000.		
	Admissions.	Deaths.	Average number constantly sick.	Admissions.	Deaths.	Constantly sick.
SPECIFIC DISEASES DUE TO INFECTION OR INFESTATION—*contd.*						
Scarlet fever	..	..	..	..	..	..
Small-pox	..	..	..	..	..	..
Tuberculosis — Pulmonary	7	1	1·52	1·8	0·26	0·39
Tuberculosis — Other	1	..	0·27	0·3	..	0·07
Venereal diseases — Gonorrhœa	69	..	9·92	17·7	..	2·54
Venereal diseases — Soft chancre	8	..	0·87	2·0	..	0·22
Venereal diseases — Syphilis	8	..	0·63	2·0	..	0·16
Venereal diseases — Other V. D.	2	..	0·09	0·5	..	0·02
Other diseases due to infection	19	1	1·00	4·9	0·26	0·26
Diseases due to infestation by Metazoan parasites — Scabies	3	..	0·07	0·8	..	0·02
Diseases due to infestation by Metazoan parasites — Other diseases	14	..	0·50	3·6	..	0·13
OTHER DISEASES CLASSIFIED UNDER SYSTEMS.						
Diseases of the nervous system	27	..	1·65	6·9	..	0·42
Mental diseases	28	..	3·47	7·2	..	0·89
Diseases of the—						
Eye	13	..	0·74	3·3	..	0·19
Ear and nose	56	..	1·87	14·3	..	0·48
Circulatory system — Valvular diseases of the heart	4	..	0·25	1·0	..	0·06
Circulatory system — Disordered action of the heart	21	..	0·82	5·4	..	0·21
Circulatory system — Other diseases	4	1	0·38	1·0	0·26	0·10
Blood and blood forming organs	9	.	0·91	2·3	..	0·23
Ductless or endocrine glands	1	..	0·02	0·3	..	0·01
Breast	1	..	0·02	0·3	..	0·01
Respiratory system — Larynx and trachea	1	..	0·02	0·3	..	0·01
Respiratory system — Bronchi and bronchioles	37	..	1·30	9·5	..	0·33
Respiratory system — Other diseases	10	..	0·88	2·6	..	0·23

Teeth and gums		6	..	0·12	1·5	..	0·03
Digestive system.	Inflammation of tonsils	103	..	2·81	26·4	..	0·72
	Inflammation of pharnyx	19	..	0·59	4·9	..	0·15
	Inflammation of stomach	7	..	0·25	1·8	..	0·06
	Gastric ulcer	..	..	0·01	..	..	..
	Duodenal ulcer	..	..	..	..	..	..
	Liver	1	..	0·14	0·3	..	0·04
	Other diseases	130	1	5·76	33·3	0·26	1·47
Diseases due to disorders of nutrition or of metabolism		1	..	0·04	0·3	..	0·01
Diseases of the :—							
Generative system		34	..	2·10	8·7	..	0·54
Bones, joints, muscles, fasciæ and bursæ		109	..	5·72	27·9	..	1·46
Areolar tissue		181	..	6·49	46·3	..	1·66
Skin		111	..	5·03	28·4	..	1·29
Urinary system		15	..	1·02	3·8	..	0·26
Injuries	General	2	1	0·04	0·5	0·26	0·01
	Local	193	2	9·25	49·4	0·51	2·37
	In action	..	..	..	..	..	..
Tumours and cysts		13	1	0·90	3·3	0·26	0·23
Poisons		1	1	0·03	0·3	0·26	0·01
No appreciable disease		4	..	0·07	1·0	..	0·02
Suicides		..	..	..	..	..	..
	Total	2,114	12	94·10	540·9	3 07	24·08

TABLE IV.

WARRANT OFFICERS, N. C. Os. AND MEN—*contd.*

EASTERN COMMAND.

Table showing the Average Strength, Admissions into Hospital, Deaths and Constantly Sick during the year 1935 with Ratios per 1,000 of the Strength.

Diseases. Average strength 15,819	Actuals.			Ratio per 1,000.		
	Admissions.	Deaths.	Average number constantly sick.	Admissions.	Deaths.	Constantly sick.
SPECIFIC DISEASES DUE TO INFECTION OR INFESTATION.						
Common cold	142	..	2·49	9·0	..	0·16
Diphtheria	15	..	1·18	0·9	..	0·07
Dysentery	484	1	21·38	30·6	0·06	1·35
Enteric fever (inclusive of typhoid, para. A, B and C and enteric group)	37	3	4·63	2·3	0·19	0·29
Erysipelas	..	..	..	..	..	..
Influenza	189	..	5·96	11·9	..	0·38
Malaria	708	2	30·13	44·8	0·13	1·90
Measles	7	..	0·37	0·4	..	0·02
Meningococcal infection	..	..	..	..	..	..
Mumps	4	..	0·27	0·3	..	0·02
Pneumonia	70	11	6·13	4·4	0·70	0·39
Pyrexia of uncertain origin	3	..	0·20	0·2	..	0·01
Rheumatic fever	14	1	1·48	0·9	0·06	0·09
Sandfly fever	385	..	8·52	24·3	..	0·54

Scarlet fever	1	..	0·12	0·1	...	0·01
Small-pox	3	..	0·43	0·2	..	0·03
Tuberculosis — *Pulmonary*	15	1	6·90	0·9	0·06	0·44
Tuberculosis — *Other*	8	..	2·46	0·5	..	0·16
Venereal diseases — *Gonorrhœa*	521	..	60·12	32·9	..	3·80
Venereal diseases — *Soft chancre*	157	..	16·72	9·9	..	1·06
Venereal diseases — *Syphilis*	124	..	9·78	7·8	..	0·62
Venereal diseases — *Other V. D.*	3	..	0·12	0·2	..	0·01
Other diseases due to infection	191	2	8·27	12·1	0·13	0·52
Diseases due to infestation by Metazoan parasites — Scabies	25	..	0·79	1·6	..	0·05
Diseases due to infestation by Metazoan parasites — Other diseases	46	..	0·96	3·0	..	0·06
OTHER DISEASES CLASSIFIED UNDER SYSTEMS.						
Diseases of the nervous system	128	..	6·34	8·1	..	0·40
Mental diseases	61	..	10·95	3·9	..	0·69
Diseases of the eye	48	..	1·97	3·0	..	0·12
Diseases of the ear and nose	340	..	9·35	21·5	..	0·59
Diseases of the circulatory system. — Valvular diseases of the heart	6	2	1·11	0·4	0·13	0·07
Diseases of the circulatory system. — Disordered action of the heart	30	..	2·02	1·9	..	0·13
Diseases of the circulatory system. — Other diseases	25	1	1·62	1·6	0·06	0·10
Diseases of the blood and blood forming organs	88	..	5·30	5·6	..	0·33
Diseases of ductless or endocrine glands	4	..	0·46	0·3	..	0·03
Diseases of the breast	3	..	0·09	0·2	..	0·01
Diseases of the respiratory system. — Larynx and trachea	21	..	0·40	1·3	..	0·03
Diseases of the respiratory system. — Bronchi and bronchioles	299	..	11·40	18·9	..	0·72
Diseases of the respiratory system. — Other diseases.	50	..	3·72	3·2	..	0·24
Diseases of the teeth and gums	45	..	1·37	2·8	..	0·09
Diseases of the Digestive system. — Inflammation of tonsils	432	..	10·72	27·3	..	0·68
Diseases of the Digestive system. — Inflammation of pharynx	190	..	3·91	12·0	..	0·25
Diseases of the Digestive system. — Inflammation of stomach	80	..	2·75	5·1	..	0·17
Diseases of the Digestive system. — Gastric ulcer	5	2	0·62	0·3	0·13	0·04
Diseases of the Digestive system. — Duodenal ulcer	5	1	1·15	0·3	0·06	0·07
Diseases of the Digestive system. — Liver	22	1	1·59	1·4	0·06	0·10
Diseases of the Digestive system. — Other diseases	831	3	32·65	52·5	0·19	2·06

TABLE IV—*contd.*

Diseases. Average strength 15,819.	Actuals. Admissions.	Deaths.	Average number constantly sick.	Ratio per 1,000. Admissions.	Deaths.	Constantly sick.
OTHER DISEASES CLASSIFIED UNDER SYSTEMS—*contd.*						
Diseases due to disorders of nutrition or of metabolism	7	3	0·38	0·4	0·19	0·02
Diseases of the generative system	221	..	12·29	14·0	..	0·78
Diseases of bones, joints, muscles, fasciæ and bursæ	379	..	20·27	24·0	..	1·28
Diseases of the areolar tissue	815	..	27·44	51·5	..	1·73
Diseases of the skin	462	..	18·69	29·2	..	1·18
Diseases of the urinary system	74	1	5·97	4·7	0·06	0·38
Injuries—General	40	5	1·17	2·5	0·32	0·07
Injuries—Local	977	6	41·62	61·8	0·38	2·63
Injuries—In action	..	..	..	..	..	..
Tumours and cysts	33	1	2·29	2·1	0·06	0·14
Poisons	4	..	0·10	0·3	..	0·01
No appreciable disease	50	..	1·63	3·2	..	0·10
*Suicides	..	(3)	..	..	(0·19)	..
Total	8,927	47	430·75	564·3	2·97	27·23

*The figures against "Suicides" having already been shown under the heading of the injury, etc., which caused death, are not included in the total.

TABLE V.

WARRANT OFFICERS, N. C. Os. AND MEN—*contd.*

SOUTHERN COMMAND.

Table showing the Average Strength, Admissions into Hospital, Deaths and Constantly Sick, during the year 1935, with Ratios per 1,000 of the Strength.

Diseases.	Actuals.			Ratio per 1,000.		
	Admissions.	Deaths.	Average number constantly sick.	Admissions.	Deaths.	Constantly sick.
Average strength 14,423.						
SPECIFIC DISEASES DUE TO INFECTION OR INFESTATION.						
Common cold	39	..	0·71	2·7	..	0·05
Diphtheria	11	..	1·02	0·8	..	0·07
Dysentery	369	..	14·65	25·6	..	1·02
Enteric fever (inclusive of Typhoid, Para. A, B and C and enteric group).	10	1	1·38	0·7	0·07	0·10
Erysipelas	1	..	0·02	0·1	..	0·00
Influenza	182	..	4·51	12·6	..	0·31
Malaria	706	..	26·41	48·9	..	1·83
Measles	7	..	0·47	0·5	..	0·03
Meningococcal infection	..	..	..	..	..	..
Mumps	9	..	0·40	0·6	..	0·03
Pneumonia	52	2	5·41	3·6	0·14	0·37
Pyrexia of uncertain origin	16	..	1·12	1·1	..	0·08
Rheumatic fever	22	..	2·75	1·5	..	0·19
Sandfly fever	125	..	2·62	8·7	—	0·18

TABLE V—*contd.*

Diseases. Average strength—14,423.	Actuals. Admissions.	Actuals. Deaths.	Actuals. Average number constantly sick.	Ratio per 1,000. Admissions.	Ratio per 1,000. Deaths.	Ratio per 1,000. Constantly sick.
SPECIFIC DISEASES DUE TO INFECTION OR INFESTATION—*contd.*						
Scarlet fever	2	..	0·20	0·1	..	0·01
Small-pox	..	..	..	..	..	..
Tuberculosis — Pulmonary	18	1	7·25	1·2	0·07	0·50
Tuberculosis — Other	1	..	0·21	0·1	..	0·01
Venereal diseases — Gonorrhœa	357	..	45·16	24·8	..	3·13
Venereal diseases — Soft chancre	112	..	10·47	7·8	..	0·73
Venereal diseases — Syphilis	80	..	7·25	5·5	..	0·50
Venereal diseases — Other V. D.	3	..	0·30	0·2	..	0·02
Other diseases due to infection	191	1	8·27	13·2	0·07	0·57
Diseases due to infestation by Metazoan parasites — Scabies	19	..	0·47	1·3	..	0·03
Diseases due to infestation by Metazoan parasites — Other diseases	73	..	1·98	5·1	..	0·14
OTHER DISEASES CLASSIFIED UNDER SYSTEMS.						
Diseases of the nervous system	117	1	8·93	8·1	0·07	0·62
Mental diseases	42	..	13·42	2·9	..	0·93
Diseases of the eye	51	..	2·33	3·5	..	0·16
Diseases of the ear and nose	322	..	10·64	22·3	..	0·74
Diseases of the circulatory system — Valvular disease of the heart	8	..	1·33	0·5	..	0·09
Diseases of the circulatory system — Disordered action of the heart	23	1	1·52	1·6	0·07	0·11
Diseases of the circulatory system — Other diseases	31	..	2·14	2·1	..	0·15
Diseases of the blood and blood forming organs	93	..	5·48	6·4	..	0·38
Diseases of ductless or endocrine glands	5	..	0·67	0·3	..	0·05
Diseases of the breast	2	..	0·05	0·1	..	0·00

Diseases of the respiratory system.	Larynx and trachea	12	..	0·53	0·8	..	0·04
	Bronchi and bronchioles	211	..	7·65	14·6	..	0·53
	Other diseases	22	..	1·87	1·5	..	0·13
Diseases of the teeth and gums		48	..	1·22	3·3	..	0·08
Diseases of the digestive system.	Inflammation of tonsils	382	..	9·16	26·5	..	0·64
	Inflammation of pharynx	84	..	1·81	5·8	..	0·13
	Inflammation of stomach	70	..	2·92	4·9	..	0·20
	Gastric ulcer	2	..	0·16	0·1	..	0·01
	Duodenal ulcer	11	..	1·69	0·8	..	0·12
	Liver diseases	16	..	1·34	1·1	..	0·09
	Other diseases	767	2	32·45	53·2	0·14	2·25
Diseases due to disorders of nutrition or of metabolism		..	..	0·18	..	..	0·01
Diseases of the generative system		199	..	9·13	13·8	..	0·63
Diseases of bones, joints, muscles, fasciæ and bursæ		312	..	19·21	21·6	..	1·33
Diseases of the areolar tissue		737	..	24·96	51·1	..	1·73
Diseases of the skin		479	..	21·30	33·2	..	1·48
Diseases of the urinary system		87	..	5·88	6·0	..	0·41
Injuries	General	29	2	0·62	2·0	0·14	0·04
	Local	877	8	39·21	60·8	0·55	2·72
	In action	..	..	..	..	..	..
Tumours and cysts		41	1	1·66	2·8	0·07	0·12
Poisons		5	..	0·13	0·3	..	0·01
No appreciable disease		51	..	2·03	3·5	..	0·14
*Suicides		..	(3)	..	..	(0·21)	..
	Total	7,541	20	374·65	522·8	1·39	25·98

*The figures against "Suicides" having already been shown under the heading of the injury, etc., which caused death, are not included in the total.

TABLE VI.

WARRANT OFFICERS, N. C. Os. AND MEN—*contd.*

BURMA DISTRICT.

Table showing the average strength, admissions into hospital, deaths and constantly sick, during the year 1935,—with ratios per 1,000 of the strength.

Diseases.	Actuals.			Ratio per 1,000.		
Average strength—1,813.	Admissions.	Deaths.	Average number constantly sick.	Admissions.	Deaths.	Constantly sick.
SPECIFIC DISEASES DUE TO INFECTION OR INFESTATION.						
Common cold	3	..	0·07	1·7	..	0·04
Diphtheria	1	..	0·17	0·6	..	0·09
Dysentery	58	..	2·41	32·0	..	1·33
Enteric fever (inclusive of typhoid, para. A, B, and C, and enteric group).	6	..	1·06	3·3	..	0·58
Erysipelas	1	..	0·03	0·6	..	0·02
Influenza	11	..	0·33	6·1	..	0·18
Malaria	53	..	2·16	29·2	..	1·19
Measles	..	..	..	..	..	..
Meningococcal infection	..	..	..	..	..	..
Mumps	..	..	..	..	..	..
Pneumonia	1	..	0·07	0·6	..	0·04
Pyrexia of uncertain origin	1	..	0·04	0·6	..	0·02
Rheumatic fever	..	..	..	..	..	..
Sandfly fever	..	..	..	..	..	..
Scarlet fever	..	..	..	..	..	..
Small-pox	..	..	..	..	..	..

Tuberculosis — Pulmonary	2	..	0·67	1·1	..	0·37
Tuberculosis — Other	1	..	0·14	0·6	..	0·08
Venereal diseases — Gonorrhœa	78	..	10·94	43·0	..	6·03
Venereal diseases — Soft chancre	22	..	1·17	12·1	..	0·65
Venereal diseases — Syphilis	42	1	3·53	23·2	0·55	1·95
Venereal diseases — Other V. D.	2	..	0·28	1·1	..	0·15
Other diseases due to infection	111	..	3·11	61·2	..	1·72
Diseases due to infestation by Metazoan parasites. — Scabies	2	..	0·03	1·1	..	0·02
Diseases due to infestation by Metazoan parasites. — Other diseases	5	..	0·31	2·8	..	0·17

OTHER DISEASES CLASSIFIED UNDER SYSTEMS.

Diseases of the nervous system	18	..	0·80	9·9	..	0·44
Mental diseases	6	..	0·68	3·3	..	0·38
Diseases of the eye	9	..	0·55	5·0	..	0·30
Diseases of the ear and nose	31	..	0·86	17·1	..	0·47
Diseases of the circulatory system. — Valvular diseases of the heart	..	..	..	..	..	..
Diseases of the circulatory system. — Disordered action of the heart	2	..	0·07	1·1	..	0·04
Diseases of the circulatory system. — Other diseases	6	..	0·49	3·3	..	0·27
Diseases of the blood and blood forming organs	16	..	0·88	8·8	..	0·49
Diseases of the ductless or endocrine glands	1	..	0·08	0·6	..	0·04
Diseases of the breast	..	..	..	..	..	..
Diseases of the respiratory system. — Larynx and trachea	6	..	0·17	3·3	..	0·09
Diseases of the respiratory system. — Bronchi and bronchioles	17	..	0·57	9·4	..	0·31
Diseases of the respiratory system. — Other diseases	1	..	0·04	0·6	..	0·02
Diseases of the teeth and gums	13	..	0·39	7·2	..	0·22
Diseases of the digestive system. — Inflammation of tonsils	64	..	1·82	35·3	..	1·00
Diseases of the digestive system. — Inflammation of pharynx	10	..	0·24	5·5	..	0·13
Diseases of the digestive system. — Inflammation of stomach	10	..	0·60	5·5	..	0·33
Diseases of the digestive system. — Gastric ulcer	1	..	0·08	0·6	..	0·04
Diseases of the digestive system. — Duodenal ulcer	..	..	..	..	..	..
Diseases of the digestive system. — Liver	7	..	0·66	3·9	..	0·36
Diseases of the digestive system. — Other diseases	71	..	4·09	39·2	..	2·26

TABLE VI—*contd.*

Diseases.	Actuals.			Ratio per 1,000.		
	Admissions.	Deaths.	Average number constantly sick.	Admissions.	Deaths.	Constantly sick.
Average strength—1,813.						
OTHER DISEASES CLASSIFIED UNDER SYSTEMS—*contd.*						
Diseases due to disorders of nutrition or of metabolism	..	..	..	..	..	..
Diseases of the generative system	27	..	1·39	14·9	..	0·77
Diseases of the bones, joints, muscles, fasciæ and bursæ	36	..	2·63	19·9	..	1·45
Diseases of the areolar tissue	123	..	4·91	67·8	..	2·71
Diseases of the skin	63	..	3·56	34·7	..	1·96
Diseases of the urinary system	16	..	1·14	8·8	..	0·63
Injuries—General	1	..	0·03	0·6	..	0·02
Injuries—Local	122	3	5·26	67·3	1·65	2·90
Injuries—In action	..	..	..	..	..	..
Tumours and cysts	4	..	0·47	2·2	..	0·26
Poisons	..	..	..	..	..	..
No appreciable disease	..	..	..	..	..	..
*Suicides	..	(1)	..	..	(0·55)	..
Total	1,081	4	58·98	596·2	2·21	32·53

*The figures against "suicides" having already been shown under the heading of the injury, etc., which caused death, are not included in the total.

TABLE VII.

BRITISH OTHER RANKS.

Table showing monthly ratios per 1,000 of the strength of admissions for certain diseases for all India during the year 1935.

1935.	Enteric group of fevers.	Influenza.	Cholera.	Small-pox.	Malaria.	Dysentery protozoal.	Dysentery bacillary.	Dysentery bacillary exudate.	Dysentery group.	Pyrexia of uncertain origin.	Pneumonia (Lobar and Lobular).	Diarrhœa.	Dengue.	Sandfly fever.	plague.	Effects of Heat.	All Causes.
January	0·1	1·9	..	..	1·7	0·2	0·7	0·5	0·2	0·02	0·5	0·5	0·2	0·1	..	..	42·6
February	0·1	0·8	..	..	1·0	0·2	0·3	0·4	0·1	0·1	0·3	0·6	0·1	0·2	..	..	32·4
March	0·2	1·0	..	..	1·2	0·1	0·5	0·6	0·6	..	0·3	0·8	0·1	0·6	..	0·05	39·0
April	0·2	1·2	0·02	..	1·3	0·2	1·5	0·7	1·2	0·04	0·4	1·3	0·3	1·6	..	0·02	41·8
May	0·2	2·5	..	0·1	1·7	0·4	1·3	1·2	1·0	0·2	0·5	2·0	0·1	5·1	..	0·04	52·4
June	0·2	0·3	..	..	2·3	0·2	1·0	0·6	0·6	0·1	0·6	1·3	0·3	5·3	..	0·3	48·7
July	0·1	0·9	0·02	..	4·3	0·3	1·7	0·6	0·4	0·1	0·2	1·5	0·8	9·1	..	0·8	60·2
August	0·2	0·6	..	..	8·6	0·3	1·6	0·6	0·9	0·1	0·1	2·7	0·7	5·5	..	0·1	59·1
September	0·1	0·2	..	..	13·1	0·3	1·0	0·4	0·6	..	0·02	1·1	0·8	4·9	..	..	55·6
October	0·3	0·3	..	..	10·0	0·2	0·7	0·4	0·3	0·04	0·1	0·9	1·0	2·7	..	..	51·6
November	0·02	0·3	..	..	8·3	0·3	0·7	0·5	0·5	0·02	0·4	0·7	0·2	0·9	..	0·02	45·8
December	0·1	0·5	..	..	3·6	0·2	0·6	0·5	0·3	0·02	0·4	0·5	0·2	0·2	..	..	36·7
Total	2·0	13·5	0·04	0·1	56·2	2·8	11·7	7·0	6·8	0·7	4·0	14·1	4·8	36·5	..	1·3	565·8

TABLE

BRITISH

Table showing ratios per 1,000 of strength of admissions for certain

India

Stations and Districts.	Average annual strength.	Enteric group of fevers.					Dysentery.			
		Typhoid fever.	Para. A.	Para. B.	Para. C.	Enteric group.	Bacillary Bact.	Bacillary exudate.	Protozoal.	Clinical.
Cherat	332	..	..	..	..	6·0	6·0	6·0	..	3·0
Landikotal	721	1·4	..	..	..	4·2	20·8	12·5	1·4	22·2
Nowshera	1,297	0·8	..	..	..	0·8	8·5	..	0·8	6·9
Peshawar	1,248	2·4	..	..	..	3·2	28·0	10·4	3·2	28·8
Risalpur	525	..	..	..	..	..	..	1·9	..	..
Peshawar District	4,123	1·2	..	..	..	2·4	15·3	6·1	1·5	15·0
Kohat	158	..	12·7	..	..	6·3	25·3	..	6·3	31·6
Fort Lockhart	7	..	..	..	..	..	..	..	..	..
Thal	5	..	..	..	..	..	..	..	..	..
Kohat District	170	..	11·8	..	..	5·9	23·5	..	5·9	29·4
Abbottabad	193	..	..	..	..	..	10·4	..	..	5·2
Barian	202	..	..	..	..	..	4·9	4·9	..	4·9
Campbellpore	137	..	..	..	..	..	7·3	14·6	..	21·9
Gharial	374	..	..	..	..	..	2·7	2·7	..	..
Jhelum	7	..	..	..	..	..	..	..	..	..
Kalabagh (Hazara)	63	..	..	..	..	..	..	..	..	15·9
Khanspur	167	..	..	..	..	..	6·0	35·9	..	..
Kuldana	278	..	..	..	..	..	..	..	..	..
Murree	92	..	..	..	..	..	..	21·7	10·9	..
Rawalpindi	2,525	0·4	..	..	..	0·4	6·3	5·1	4·8	5·5
Upper Topa	...	..	..	..	..	..	..	..	..	..
Rawalpindi District	4,054	0·2	..	..	..	0·2	5·4	6·2	3·2	4·9
Ambala	709	..	..	..	..	5·6	22·6	9·9	1·4	12·7
Dagshai	346	..	..	..	..	..	17·3	..	2·9	8·7
Amritsar	140	..	7·1	..	..	..	..	..	7·1	..
Dalhousie	426	7·0	..	..	..	2·3	9·4	9·4	..	4·7
Ferozepore	885	..	..	..	..	2·3	..	3·4	..	35·0
Jullundur	770	..	..	..	..	1·3	2·6	5·2	1·3	2·6
Jutogh	216	..	..	..	..	..	13·9	13·9	..	..
Kasauli	183	..	..	..	..	..	21·9	5·5	5·5	..
Lahore	1,174	2·6	..	..	..	4·3	17·0	11·9	8·5	6·0
Multan	637	6·3	..	..	..	1·6	1·6	14·1	1·6	14·1
Subathu	131	..	..	..	..	..	..	..	..	53·4
Sialkot	1,806	..	..	..	..	1·5	3·8	6·1	5·4	4·6
Solon	91	..	..	..	..	..	..	..	..	..
Lahore District	7,014	1·4	0·1	..	..	2·3	8·7	7·6	3·3	10·8
Bannu	89	..	..	..	..	..	44·9	..	..	..
Dera Ismail Khan	62	..	..	..	..	..	16·1	..	..	..
Kalabagh and Mari Indus	13	..	..	..	..	..	..	..	..	..
Manzai	12	..	..	..	..	..	..	..	8·3	..
Razmak	1,062	..	..	..	..	..	4·7	..	0·9	..
Mir Ali	10	..	..	..	..	..	..	..	..	..
Wana	74	..	..	..	..	..	..	..	..	..

VIII.

OTHER RANKS.

diseases and constantly sick for all causes in each station and district in during 1935.

Diarrhœa.	Cholera.	Venereal diseases.	Small-pox.	Malaria	Dengue.	Sandfly fever.	Plague.	Influenza.	Pneumonia (Lobar and Lobular).	Heat-stroke.	Heat-exhaustion.	All Causes.	Average annual number Constantly sick.
24·1	..	21·1	..	63·3	..	51·2	..	18·1	6·0	..	..	593·4	21·84
23·6	..	9·7	..	23·6	..	522·9	..	12·5	5·5	..	..	1,131·8	27·00
6·2	..	15·4	..	69·4	..	144·9	..	1·5	13·9	0·8	..	652·3	27·89
24·0	..	28·8	..	132·2	..	291·7	..	1·5	7·2	..	1·5	954·3	39·18
22·9	..	5·7	..	45·7	..	26·7	..	..	7·6	..	..	369·5	6·48
18·2	..	17·7	..	76·9	..	232·8	..	4·6	9·0	0·2	0·5	786·8	27·94
6·3	..	..	..	63·8	..	63·3	..	6·3	19·0	..	..	588·6	23·80
..	..	..	..	..	..	..	..	..	142·9	..	..	142·9	0·00
..	..	..	..	..	..	..	..	..	..	..	..	..	..
5·9	..	..	..	58·8	..	58·8	..	5·9	23·5	..	..	552·9	22·12
98·4	..	15·5	..	88·1	..	..	.	..	..	..	..	751·3	22·02
..	..	74·3	..	54·5	..	59·4	..	..	..	..	..	361·4	39·06
14·6	..	7·3	..	58·4	..	36·5	..	..	7·3	..	..	583·9	15·62
5·3	..	42·8	..	18·7	..	13·4	..	2·7	2·7	..	..	286·1	11·18
..	..	..	..	1,000·0	..	..	..	..	..	..	..	1,142·9	12·86
..	..	..	..	..	..	..	..	..	..	..	..	381·0	10·95
..	..	12·0	..	29·9	..	18·0	..	6·0	..	..	..	341·3	11·32
3·6	..	..	..	3·6	..	3·6	..	10·8	..	..	..	377·7	11·58
10·9	..	..	..	32·6	..	32·6	..	10·9	21·7	..	..	1,184·8	176·52
9·1	..	17·8	..	57·4	..	57·4	..	19·0	4·4	..	..	499·4	25·83
..	..	..	..	..	..	..	..	..	..	..	..	..	..
11·8	..	20·2	..	50·3	..	42·9	..	13·3	3·7	..	..	485·7	26·10
19·7	..	28·2	..	42·3	..	31·0	..	50·8	..	..	1·4	579·7	26·71
17·3	..	34·7	..	37·6	..	31·8	..	..	..	..	..	586·7	18·99
28·6	..	121·4	..	64·3	..	42·9	..	14·3	..	..	7·1	792·9	42·79
4·7	..	23·5	..	21·1	..	4·7	..	..	4·7	..	..	535·2	25·35
9·0	..	53·1	..	31·4	..	71·2	..	..	3·4	3·4	1·1	655·4	26·43
15·6	..	22·1	..	9·1	..	19·5	..	..	3·9	..	11·7	515·6	19·12
13·9	..	50·9	..	9·3	..	..	..	..	4·6	..	..	777·8	25·32
10·9	..	10·9	..	92·9	..	..	..	..	..	..	..	688·5	56·07
17·0	..	71·5	..	69·8	..	26·4	..	5·1	8·5	1·7	9·4	712·9	42·90
7·8	..	36·1	..	31·4	..	23·5	..	3·1	1·6	..	1·6	525·9	23·33
45·8	..	7·6	..	45·8	..	45·8	..	..	7·6	..	..	519·1	13·36
13·0	..	19·9	..	20·7	..	47·5	..	0·8	2·3	0·8	6·1	518·4	21·47
11·0	..	11·0	..	..	..	..	..	..	..	..	..	329·7	10·88
14·3	..	38·6	..	41·9	..	33·2	..	6·7	3·4	0·9	4·6	594·7	27·40
11·2	..	22·5	..	157·3	..	78·7	..	11·2	..	..	..	764·0	26·74
16·1	..	..	..	306·5	..	16·1	..	..	..	..	..	516·1	15·81
..	..	..	..	230·8	..	..	..	..	..	..	..	230·8	3·85
..	..	..	..	166·7	..	..	..	..	..	..	83·3	583·3	15·83
11·3	..	12·2	..	60·3	..	1·9	..	3·8	2·8	..	..	499·1	25·14
..	..	..	..	300·0	..	..	..	..	..	..	..	300·0	8·00
..	..	..	..	283·8	..	27·0	..	..	..	..	..	700·2	19·32

TABLE

Stations and Districts.	Average annual strength.	Enteric group of fevers.					Dysentery.			
		Typhoid fever.	Para. A.	Para. B.	Para. C.	Enteric group.	Bacillary Bact.	Bacillary exudate.	Protozoal.	Clinical.
Waziristan District	1,822	..	..	..	..	..	7·6	..	1·5	..
Quetta	2,386	0·4	..	..	..	0·8	18·4	8·0	1·7	12·6
Baluchistan District	2,386	0·4	..	..	..	0·8	18·4	8·0	1·7	12·6
Loralai	...	..	..	..	..	..	..	..	..	..
Zhob Brigade Area	...	..	..	..	..	..	..	..	..	..
Hyderabad	399	..	..	..	..	..	10·0	..	..	15·0
Karachi	1,123	..	0·9	..	..	0·9	18·7	0·9	1·8	13·4
Sind Bde. Area	1,522	..	0·7	..	..	0·7	16·4	0·7	1·3	13·8
Bareilly	746	..	..	..	..	..	16·1	6·7	..	13·4
Chakrata	878	..	..	..	..	..	..	17·1	..	..
Dehra Dun	79	..	..	..	..	..	12·7	..	..	..
Jhansi	975	1·0	..	..	..	..	9·2	6·1	5·1	5·1
Landour	50	..	..	..	..	20·0	20·0	..	..	..
Meerut	1,715	..	0·6	..	..	1·2	12·2	21·6	2·9	2·3
Roorkee	275	..	..	..	..	..	36·4	18·2	14·5	3·6
Meerut District	4,718	0·2	0·2	..	..	0·6	11·4	14·4	3·0	4·2
Allahabad	838	..	..	..	..	1·2	9·5	10·7	7·2	10·7
Benares	126	..	7·9	..	..	..	7·9	7·9	7·9	7·9
Cawnpore	774	1·3	..	..	..	1·3	..	..	..	12·9
Fyzabad	743	..	..	..	..	1·3	6·7	2·7	..	14·8
Lucknow	2,288	..	..	..	..	0·4	10·9	3·1	2·6	..
Ranikhet	1,108	..	..	..	..	..	19·0	3·6	9·0	23·5
Lucknow District	5,877	0·2	0·2	..	...	0·7	10·2	3·9	3·9	9·7
Calcutta	901	1·1	2·2	..	..	4·4	21·1	4·4	5·5	8·9
Barrackpore	576	..	1·7	..	..	3·5	6·9	10·4	10·4	..
Dinapore	634	..	..	..	..	..	..	3·2	..	1·6
Lebong	555	1·8	..	..	..	5·4	..	1·8	3·6	1·8
Dacca	572	1·7	..	..	..	8·7	7·0	3·5	1·7	3·5
N. & A. District	3,238	0·9	0·9	..	..	4·3	8·3	4·6	4·3	3·7
Agra	722	1·4	..	..	..	1·4	1·4	1·4	..	5·5
Delhi	994	1·0	1·0	..	..	..	4·0	22·1	7·0	7·0
Muttra	262	..	..	..	..	..	7·6	..	3·8	38·2
Delhi Ind. Bde.	1,986	1·0	0·5	..	...	0·5	3·5	11·6	4·0	10·6
Ahmednagar	899	..	..	..	..	..	14·5	5·6	2·2	..
Jubbulpore	1,358	1·5	..	..	..	..	12·5	10·3	3·7	..
Kamptee	731	..	..	..	..	..	1·4	2·7	..	5·5
Secunderabad	2,676	0·4	0·4	..	..	0·7	22·9	5·6	2·2	3·7
Pachmarhi	58	..	..	..	..	..	17·2	..	..	..
Saugor	22	..	..	..	..	..	..	45·5	..	..

VIII—*contd.*

Diarrhœa.	Cholera.	Venereal diseases.	Small-pox.	Malaria.	Dengue.	Sandfly fever.	Plague.	Influenza.	Pneumonia (Lobar and Lobular).	Heat-stroke.	Heat-exhaustion.	All Causes.	Average annual number constantly sick.
10·6	..	11·3	..	95·3	..	9·1	..	3·8	2·3	..	0·8	525·0	24·06
7·1	..	15·1	..	171·8	..	2·1	..	17·2	4·2	..	..	594·7	22·83
7·1	..	15·1	..	171·8	..	2·1	..	17·2	4·2	..	..	594·7	22·83
..	..	..	..	..	..	..	..	..	..	..	..	..	..
12·5	..	60·1	..	210·5	..	..	..	5·0	2·5	..	..	548·9	16·14
8·6	..	22·3	..	37·4	..	17·8	..	..	0·9	..	..	423·9	30·11
5·9	..	32·2	..	82·8	..	13·1	..	1·3	1·3	..	..	456·6	26·45
21·4	..	48·3	..	18·8	..	34·9	..	9·4	2·7	..	..	506·7	29·44
37·6	..	27·3	..	39·9	4·6	8·0	..	..	1·1	..	..	462·4	21·55
12·7	..	139·2	..	38·0	..	12·7	..	38·0	..	..	..	810·1	37·72
31·8	..	30·8	..	70·8	1·0	34·9	..	3·1	2·1	..	1·0	538·5	21·85
..	..	40·0	..	20·0	..	..	..	..	..	..	..	440·0	12·00
13·4	..	26·8	..	84·5	0·6	11·1	..	19·8	8·2	..	2·3	583·7	30·94
10·9	..	76·4	..	36·4	..	..	..	..	7·3	..	..	476·4	9·64
22·7	..	36·0	..	58·7	1·3	18·4	..	10·0	4·5	..	1·1	535·6	25·75
17·9	..	57·3	..	101·4	1·2	74·0	..	8·4	4·8	1·2	1·2	700·5	34·16
7·9	..	103·2	..	7·9	23·8	182·5	..	..	7·9	..	15·9	920·6	45·63
20·7	..	33·6	1·3	27·1	6·5	85·3	..	3·9	2·6	..	..	682·2	25·57
5·4	..	14·8	..	5·4	1·3	92·9	..	4·0	1·3	..	..	475·1	16·54
20·5	..	58·6	0·4	24·0	..	7·0	..	11·4	4·4	..	0·4	534·1	25·42
21·7	..	9·0	..	10·8	..	10·8	..	0·9	4·5	..	..	422·4	29·23
18·2	..	41·2	0·3	30·3	1·7	42·2	..	6·8	3·9	0·2	0·7	557·1	26·71
2·2	1·1	48·8	..	15·5	45·5	1·1	..	27·7	10·0	..	..	497·2	25·59
5·2	..	121·5	..	20·8	17·4	..	..	5·2	..	..	..	468·7	59·31
..	..	50·5	..	22·1	..	48·9	..	1·6	4·7	..	..	383·3	17·27
7·2	..	37·8	..	14·4	..	..	..	10·8	3·6	..	..	291·9	10·61
8·7	..	178·3	..	31·5	..	..	..	12·2	1·7	..	..	580·4	13·02
4·3	0·3	83·1	..	20·4	15·8	9·9	..	13·0	4·6	..	..	449·4	25·17
15·2	..	48·5	1·4	116·3	1·4	15·2	..	..	1·4	2·8	2·8	868·4	37·06
15·1	1·0	42·3	..	87·5	..	2·0	..	62·4	8·0	..	..	827·0	34·39
7·6	..	84·0	..	84·0	..	19·1	..	..	7·6	..	..	759·5	32·75
14·1	0·5	49·8	0·5	97·2	0·5	9·1	..	31·2	5·5	1·0	1·0	829·8	35·01
16·7	..	14·5	..	97·9	..	2·2	..	..	..	..	..	496·1	12·27
19·9	..	36·1	..	47·9	..	6·6	..	0·7	4·4	0·7	1·5	533·1	26·35
6·8	..	45·1	..	49·2	..	36·9	..	9·6	4·1	1·4	5·5	448·7	18·78
20·2	..	19·8	..	6·7	0·4	19·8	..	37·7	4·1	..	..	494·4	21·46
..	..	..	..	86·2	..	..	..	..	..	..	..	172·4	3·10
..	..	90·9	..	..	..	..	..	..	..	..	..	454·5	8·64

TABLE

Stations and Districts.	Average annual strength.	Enteric group of fevers.					Dysentery.			
		Typhoid fever.	Para. A.	Para. B.	Para. C.	Enteric group.	Bacillary Bact.	Bacillary exudate.	Protozoal.	Clinical.
Deccan District	5,744	0·5	0·2	...	...	0·3	16·7	6·4	2·3	2·4
Mhow	1,475	...	...	...	...	...	10·8	8·1	...	0·7
Mount Abu	60	...	...	...	...	...	...	...	...	...
Nasirabad	664	...	...	...	...	...	21·1	1·5	1·5	1·5
Ahmedabad	131	...	...	...	...	...	7·6	30·5	...	7·6
Colaba	732	...	...	...	...	4·1	4·1	4·1	1·4	2·7
Deolali	340	...	...	...	...	...	...	14·7	5·9	...
Bombay District	3,402	...	...	...	...	0·9	10·0	7·3	1·2	1·5
Belgaum	776	...	...	...	...	...	13·2	13·2	...	...
Poona	2,327	0·4	0·4	...	...	...	20·6	9·0	2·1	0·4
Purandhar	61	...	...	...	...	...	...	...	...	...
Poona Bde. Area	2,464	0·4	0·4	...	...	...	19·9	8·9	2·0	0·4
Bangalore	1,047	...	...	...	...	...	21·0	11·5	1·9	...
Madras	795	...	...	...	...	...	1·3	10·1	3·8	...
Malapurum	142	...	...	...	...	...	...	...	...	...
Wellington	829	...	...	...	...	...	7·2	1·2	8·4	4·8
Madras District	2,813	...	...	...	...	...	10·3	7·5	4·3	1·4
Mandalay	132	...	...	...	...	15·2	...	...	...	7·6
Maymyo	776	...	...	...	...	2·6	11·6	11·6	1·3	1·3
Mingaladon	777	...	...	...	...	2·6	25·7	3·9	3·9	11·6
Port Blair	128	...	...	...	...	...	...	7·8	15·6	...
Burma District	1,813	...	...	...	...	3·3	16·0	7·2	3·3	6·1
INDIA	52,646	0·5	0·2	...	...	1·3	12·1	6·7	3·0	7·4

VIII—*concld.*

Diarrhœa.	Cholera.	Venereal diseases.	Small-pox.	Malaria.	Dengue.	Sandfly fever.	Plague.	Influenza.	Pneumonia (Lobar and Lobular).	Heat-stroke.	Heat-exhaustion.	All Causes.	Average annual number constantly sick.
17·6	...	26·1	...	36·9	0·2	15·8	...	19·0	3·5	0·3	1·0	494·6	20·60
19·7	...	22·4	...	83·4	...	0·7	...	29·8	6·8	...	...	581·0	28·02
16·7	...	...	...	100·0	...	...	...	...	...	...	...	566·7	15·33
6·0	...	36·1	...	113·0	...	27·1	...	1·5	...	...	...	491·0	16·46
7·6	...	76·3	...	152·7	45·8	61·1	...	...	...	...	...	717·6	19·16
5·5	...	79·2	...	27·3	5·5	5·5	...	4·1	...	...	1·4	785·5	50·57
5·9	...	35·3	...	55·9	...	...	...	14·7	2·9	...	...	461·8	12·21
12·1	...	40·3	...	77·3	2·9	9·1	...	15·6	3·2	...	0·3	600·5	28·47
26·3	...	13·2	...	26·3	...	...	...	...	13·2	...	...	473·7	11·84
7·7	...	25·4	...	80·4	...	...	...	6·9	3·0	...	...	510·5	34·87
16·4	...	...	...	163·9	...	...	...	...	...	...	...	704·9	42·95
8·5	...	24·4	...	80·8	...	...	...	6·5	3·2	...	...	514·2	34·36
2·9	...	79·3	...	11·5	26·7	...	...	3·8	3·8	...	...	554·0	26·10
13·8	...	91·8	...	11·3	55·3	...	...	...	...	...	...	480·5	29·17
28·2	...	63·4	...	7·0	..	...	...	...	...	...	...	619·7	26·69
33·8	...	26·5	...	8·4	1·2	...	...	2·4	2·4	...	1·2	377·6	23·82
16·4	...	66·5	...	10·3	25·9	...	...	2·1	2·1	...	0·4	484·5	26·33
22·7	...	272·7	...	15·2	30·3	...	...	...	...	...	...	977·3	59·09
1·3	...	73·5	...	38·7	16·8	...	...	14·2	...	...	...	430·4	27·04
10·3	...	55·3	...	9·0	108·1	...	...	...	1·3	...	...	707·9	33·19
7·8	...	23·4	...	109·4	...	...	...	...	...	...	7·8	507·8	21·95
7·2	...	76·7	...	29·2	55·7	...	...	6·1	0·6	...	0·6	596·2	31·6
13·9	0·0	38·8	0·1	56·1	5·0	36·5	...	10·6	4·2	0·2	1·5	567·1	26·74

TABLE IX.

BRITISH OFFICERS (BRITISH SERVICE).

ALL INDIA.

Table showing the Average Strength, Admissions into Hospital, Deaths and Constantly Sick, during the year 1935, with Ratios per 1,000 of the Strength.

Diseases.	Actuals.			Ratio per 1,000.		
	Admissions.	Deaths.	Average number constantly sick.	Admissions.	Deaths.	Constantly sick.
Average strength . . . . . 2,227.						
Specific diseases due to infection or infestation.						
Common cold	11	..	0·12	4·9	..	0·05
Diphtheria	2	..	0·22	0·9	..	0·10
Dysentery	64	1	2·53	28·7	0·45	1·14
Enteric fever (inclusive of typhoid, para. A, B and C, and enteric group).	13	1	1·91	5·8	0·45	0·86
Erysipelas	..	..	..	..	..	..
Influenza	80	..	0·45	13·5	..	0·20
Malaria	79	..	2·16	35·5	..	0·97
Measles	1	..	0·05	0·4	..	0·02
Meningococcal infection	1	..	0·20	0·4	..	0·09
Mumps	4	..	0·08	1·8	..	0·04
Pneumonia	5	..	0·29	2·2	..	0·13
Pyrexia of uncertain origin	1	..	0·03	0·4	..	0·01
Rheumatic fever	2	..	0·06	0·9	..	0·03
Sandfly fever	60	..	0·89	26·9	..	0·40
Scarlet fever.	1	..	0·03	0·4	..	0·01
Small-pox	..	..	0·03	..	..	0·01
Tuberculosis { Pulmonary	1	..	0·20	0·4	..	0·09
Tuberculosis { Other	..	..	..	..	..	..
Venereal diseases { Gonorrhœa	1	..	0·06	0·4	..	0·03
Venereal diseases { Soft chancre	..	..	..	..	..	..
Venereal diseases { Syphilis	..	..	..	..	..	..
Venereal diseases { Other V. D.	..	..	..	..	..	..

Other diseases due to infection	97	..	4·00	48·6	..	1·80
Diseases due to infestation by Metazoan parasites. — Scabies	..	..	..	..	..	..
Diseases due to infestation by Metazoan parasites. — Other diseases	5	..	0·08	2·2	..	0·04
Other diseases classified under systems.						
Diseases of the nervous system	18	..	0·80	8·1	..	0·36
Mental diseases	6	..	0·98	2·7	..	0·44
Diseases of the — Eye	6	..	0·12	2·7	..	0·05
Diseases of the — Ear and nose	38	1	0·91	17·1	0·45	0·41
Diseases of the circulatory system. — Valvular disease of the heart	..	..	..	..	..	..
Diseases of the circulatory system. — Disordered action of the heart	2	..	0·02	0·9	..	0·01
Diseases of the circulatory system. — Other diseases	6	..	0·61	2·7	..	0·27
Diseases of the blood and blood forming organs	13	..	0·47	5·8	..	0·21
Diseases of ductless or endocrine glands	..	..	..	..	..	..
Diseases of the breast	..	..	..	..	..	..
Diseases of the respiratory system. — Larynx and trachea	4	..	0·10	1·8	..	0·04
Diseases of the respiratory system. — Bronchi and bronchioles	10	..	0·21	4·5	..	0·09
Diseases of the respiratory system. — Other diseases	2	..	0·17	0·9	..	0·08
Diseases of the teeth and gums	5	..	0·06	2·2	..	0·03
Diseases of the digestive system. — Inflammation of tonsils	51	..	1·26	22·9	..	0·57
Diseases of the digestive system. — Inflammation of pharynx	19	..	0·35	8·5	..	0·16
Diseases of the digestive system. — Inflammation of stomach	16	..	0·42	7·2	..	0·19
Diseases of the digestive system. — Gastric ulcer	4	..	0·27	1·8	..	0·12
Diseases of the digestive system. — Duodenal ulcer	8	..	0·77	3·6	..	0·35
Diseases of the digestive system. — Liver diseases	10	..	0·66	4·5	..	0·30
Diseases of the digestive system. — Other diseases	132	1	3·74	59·3	0·45	1·68
Diseases due to disorders of nutrition or of metabolism	1	..	0·04	0·4	..	0·02
Diseases of the generative system	2	..	0·03	0·9	..	0·01
Diseases of bones, joints, muscles, fasciæ and bursæ	32	..	1·50	14·4	..	0·67
Diseases of the areolar tissue	75	..	2·60	33·7	..	1·17
Diseases of the skin	17	..	1·09	7·6	..	0·49
Diseases of the urinary system	20	1	1·00	9·0	0·45	0·45
Injuries — General	6	4	0·12	2·7	1·80	0·05
Injuries — Local	156	6	5·47	70·9	2·69	2·46
Injuries — In action	..	..	..	..	..	..
Tumours and cysts	3	..	0·17	1·3	..	0·08
Poisons	2	..	0·04	0·9	..	0·02
No appreciable disease	6	..	0·26	2·7	..	0·12
Suicides	..	..	..	..	..	..
Total	1,048	15	37·63	470·6	6·74	16·90

TABLE X.

WIVES OF WARRANT OFFICERS, N. C. Os. AND MEN.

INDIA.

Table showing the Average Strength, Admissions into Hospital, Deaths and Constantly Sick, during the year 1935, with Ratios per 1,000 of the Strength.

Diseases.	Actuals.			Ratio per 1,000.		
Average strength . . 4,178.	Admissions.	Deaths.	Average number constantly sick.	Admissions.	Deaths.	Constantly sick.
Specific diseases due to infection or infestation.						
Common cold	12	...	0·17	2·9	...	0·04
Diphtheria	3	...	0·24	0·7	...	0·06
Dysentery	60	...	1·80	14·4	...	0·43
Enteric fever (inclusive of typhoid, para. A, B and C. and enteric group).	4	...	0·42	1·0	...	0·10
Erysipelas	3	...	0·10	0·7	..	0·02
Influenza	5	...	0·08	1·2	...	0·02
Malaria	99	...	2·64	23·7	...	0·63
Measles	2	...	0·09	0·5	...	0·02
Meningococcal infection	...	...	...	...	...	...
Mumps	1	...	0·02	0·2	...	0·00
Pneumonia	5	1	0·29	1·2	0·24	0·07
Pyrexia of uncertain origin	...	...	...	...	...	...
Rhumatic fever	6	...	0·43	1·4	...	0·10
Sandfly fever	15	...	0·21	3·6	...	0·05
Scarlet fever.	2	...	0·13	0·5	...	0·03
Small-pox	3	1	0·14	0·7	0·24	0·03
Tuberculosis — Pulmonary	3	...	0·38	0·7	...	0·09
Tuberculosis — Other	3	...	0·26	0·7	...	0·06
Venereal diseases — Gonorrhœa	...	...	...	...	...	...
Venereal diseases — Soft chancre	...	...	...	...	...	...
Venereal diseases — Syphilis	1	...	0·06	0·2	...	0·01
Venereal diseases — Other V. D.	...	...	...	...	...	...
Other diseases due to infection	21	...	0·61	5·0	...	0·15

Diseases due to infestation by metazoan parasites. — Scabies	...	...	...	...	...	...
Diseases due to infestation by metazoan parasites. — Other diseases	10	...	0·18	2·4	...	0·04
Other diseases classified under systems.						
Diseases of the nervous system	20	...	0·41	4·8	...	0·10
Mental diseases	26	...	0·76	6·2	...	0·18
Diseases of the eye	7	...	0·21	1·7	...	0·05
Diseases of the ear and nose	27	...	0·78	6·5	...	0·19
Diseases of the—						
Circulatory system. — Valvular diseases of the heart	2	1	0·13	0·5	0·24	0·03
Circulatory system. — Disordered action of the heart	7	1	0·19	1·7	0·24	0·05
Circulatory system. — Other diseases	17	1	1·00	4·1	0·24	0·24
Blood and blood forming organs	18	1	0·63	4·3	0·24	0·15
Ductless or endocrine glands	5	1	0·12	1·2	0·24	0·03
Breast	15	...	0·38	3·6	...	0·09
Respiratory system. — Larynx and trachea	3	...	0·08	0·7	...	0·02
Respiratory system. — Bronchi and bronchioles	43	...	1·23	10·3	...	0·29
Respiratory system. — Other diseases	10	...	0·52	2·4	...	0·12
Teeth and gums	17	...	0·17	4·1	...	0·04
Digestive system. — Inflammation of tonsils	56	...	0·95	13·4	...	0·28
Digestive system. — Inflammation of pharynx	8	...	0·17	1·9	...	0·04
Digestive system. — Inflammation of stomach	33	...	0·73	7·9	...	0·17
Digestive system. — Gastric ulcer	1	...	0·06	0·2	...	0·01
Digestive system. — Duodenal ulcer	3	...	0·14	0·7	...	0·03
Digestive system. — Liver	5	...	0·19	1·2	...	0·05
Digestive system. — Other diseases	222	1	6·24	53·1	0·24	1·49
Diseases due to disorders of nutrition or of metabolism	7	...	0·31	1·7	...	0·07
Diseases of the generative system	279	4	9·88	66·8	0·96	2·36
Diseases of bones, joints, muscles, fasciæ and bursæ	30	...	0·81	7·2	...	0·19
Diseases of the areolar tissue	42	1	1·24	10·1	0·24	0·30
Diseases of the skin	9	...	0·12	2·2	...	0·03
Diseases of the urinary system	57	1	2·51	13·6	0·24	0·60
Injuries — General	...	1	...	...	0·24	...
Injuries — Local	31	...	1·11	7·4	...	0·27
Injuries — In action	...	...	...	...	...	...
Tumours and cysts	18	...	1·10	4·3	...	0·26
Poisons	2	...	0·05	0·5	...	0·01
No appreciable disease	27	...	0·60	6·5	...	0·14
Suicides	...	...	...	...	...	...
Total	1,305	15	41·07	312·4	3·59	9·83

TABLE XI.

CHILDREN OF WARRANT OFFICERS, N. C. Os. AND MEN.

INDIA.

Table showing the Average Strength, Admissions into Hospital, Deaths, and Constantly Sick, during the year 1935, with Ratios per 1,000 of the Strength.

Diseases.	Actual			Ratio per 1,000.		
	Admissions.	Deaths.	Average number constantly sick.	Admissions.	Deaths.	Constantly sick.
Average strength 6,522						
Specific diseases due to infection or infestation.						
Common cold	13	..	0·18	2·0	..	0·03
Diphtheria	24	3	1·40	3·7	0·46	0·21
Dysentery	192	5	6·33	29·4	0·77	0·97
Enteric fever (inclusive of typhoid, para. A, B and C and enteric group).	12	..	1·35	1·8	..	0·21
Erysipelas	1	1	0·04	0·2	0·15	0·01
Influenza	17	..	0·34	2·6	..	0·05
Malaria	103	..	2·89	15·8	..	0·44
Measles	56	..	1·86	8·6	..	0·29
Meningococcal infection	..	..	..	..	..	..
Mumps	28	..	1·16	4·3	..	0·18
Pneumonia	24	3	1·37	3·7	0·46	0·46
Pyrexia of uncertain origin	1	..	0·08	0·2	..	0·01
Rheumatic fever	11	1	0·87	1·7	0·15	0·13
Sandfly fever	26	..	0·37	4·0	..	0·06
Scarlet fever	27	..	1·71	4·1	..	0·26
Small pox	2	..	0·14	0·3	..	0·02
Tuberculosis — Pulmonary	..	..	..	..	..	..
Tuberculosis — Other	3	..	0·16	0·5	..	0·02
Venereal diseases — Gonorrhœa	8	..	1·54	1·2	..	0·24
Venereal diseases — Soft chancre	..	..	..	..	..	..
Venereal diseases — Syphilis	..	..	..	..	..	..
Venereal diseases — Other V. D.	..	..	..	..	..	..
Other diseases due to infection	126	1	3·82	19·3	0·15	0·59

Diseases due to infestation by metazoan parasites.	Scabies	..	..	..		
	Other diseases	57	..	0·84	8·7	..	0·13
Other diseases classified under systems.							
Diseases of the nervous system		28	7	0·60	4·3	1·07	0·09
Mental disease		1	..	0·01	0·2	..	0·00
Diseases of the—							
Eye		16	..	0·63	2·5	..	0·10
Ear and nose		56	..	1·53	8·6	..	0·23
Circulatory system.	Valvular disease of the heart	1	..	0·20	0·2	..	0·03
	Disordered action of the heart	3	1	0·15	0·5	0·15	0·02
	Other diseases	6	1	1·00	0·9	0·15	0·15
Blood and blood forming organs		21	..	0·70	3·2	..	0·11
Ductless or endocrine glands		..	..	..	..	..	..
Breast		..	..	..	..	..	..
Respiratory system.	Larynx and trachea	6	..	0·20	0·9	..	0·03
	Bronchi and bronchioles	157	3	3·49	24·1	..	0·54
	Other diseases.	4	..	0·03	0·6	0·46	0·00
Teeth and gums		44	..	0·47	6·7	..	0·07
Digestive system.	Inflammation of tonsils	188	..	3·38	28·8	..	0·52
	Inflammation of pharynx	24	..	0·40	3·7	..	0·06
	Inflammation of stomach	7	..	0·09	1·1	..	0·01
	Gastric ulcer	..	..	..	..	..	..
	Duodenal ulcer	..	1	..	..	..	..
	Liver	7	16	0·11	1·1	0·15	0·02
	Other diseases	507	9	9·61	77·7	2·45	1·47
Diseases due to disorders of nutrition or of metabolism		42	6	1·69	6·4	1·38	0·26
Diseases of the—							
Generative system		38	3	1·07	5·8	0·92	0·16
Bones, joints, muscles, fasciæ and bursæ		18	..	1·06	2·8	0·46	0·16
Areolar tissue		87	..	2·42	13·3	..	0·37
Skin		35	..	1·05	5·4	..	0·16
Urinary system		31	..	1·72	4·8	..	0·26
Injuries	General	3	1	0·07	0·5	0·15	0·01
	Local	91	1	3·75	14·0	0·15	0·57
	In action	..	..	..	..	..	..
Tumours and cysts		4	..	0·09	0·6	..	0·01
Poisons		2	..	0·01	0·3	..	0·00
No appreciable disease		22	..	0·31	3·4	..	0·05
Suicides		..	..	..	..	..	..
	Total	2,180	63	62·29	334·3	9·66	9·55

TABLE XII.

BRITISH OTHER RANKS.

Table showing admission and death ratios per 1,000 of Strength by Commands contrasted with the previous year, and the average for the previous five years.

Commands.		Enteric group of fevers.		Influenza.		Cholera.		Small-pox.		Malaria.		Dysentery.	
		A.	D.	A.	D.	A.	D.	A.	D.	A.	D.	A.	D.
Northern Command	1930-34	3·9	0·29	21·2	..	..	..	0·1	..	134·6	0·07	23·3	..
	1934	1·8	0·17	14·3	..	..	..	..	..	75·8	..	20·4	..
	1935	2·9	0·30	8·0	..	..	..	..	..	57·3	..	28·8	..
Western Command	1930-34	3·6	0·15	30·7	0·15	..	..	0·1	..	146·1	0·20	34·7	..
	1934	1·5	..	33·9	..	..	..	..	..	160·4	..	46·7	..
	1935	1·3	..	11·3	..	..	..	..	..	136·1	0·51	37·1	..
Eastern Command	1930-34	3·4	0·27	16·8	0·02	0·1	..	0·1	..	79·5	0·06	23·9	0·04
	1934	2·3	0·13	15·2	..	0·3	..	0·3	..	48·1	0·06	23·5	..
	1935	2·3	0·19	11·9	..	0·1	..	0·2	..	44·8	0·13	30·6	0·06
Southern Command	1930-34	1·8	0·13	10·1	0·01	..	..	0·1	..	67·3	0·06	27·8	..
	1934	1·1	0·13	17·1	..	..	..	0·1	..	55·3	0·07	29·9	..
	1935	0·7	0·07	12·6	..	..	..	..	..	48·9	..	25·6	..
Burma District	1930-34	1·2	..	19·1	..	..	..	..	..	50·2	0·11	17·3	..
	1934	0·6	..	5·0	..	..	..	0·1	..	54·9	..	18·3	..
	1935	3·3	..	6·1	..	..	..	..	..	29·2	..	32·0	..
All-India	1930-34	3·1	0·22	17·6	0·02	0·03	..	0·1	..	97·3	0·08	25·4	0·01
	1934	1·7	0·13	16·5	..	0·1	..	0·1	..	67·5	0·04	25·5	..
	1935	2·0	0·17	10·6	..	0·04	..	0·1	..	56·1	0·08	29·2	0·02

Commands.		Pyrexia of uncertain origin.		Pneumonia, lobar and lobular.		Venereal diseases.		Dengue.		Sand-fly fever.		Plague.	
		A.	D.	A.	D.	A.	D.	A.	D.	A.	D.	A.	D.
Northern Command	1930-34	2·1	..	5·3	0·48	27·7	..	0·8	..	89·0	..	..	..
	1934	1·3	..	5·9	0·23	25·0	..	0·3	..	79·8	..	..	..
	1935	1·0	..	5·2	0·42	27·3	..	..	..	83·1	..	..	..
Western Command	1930-34	1·9	..	3·6	0·39	30·6	..	3·7	..	8·7	..	..	..
	1934	..	..	3·5	..	24·8	..	3·2	..	7·9	..	..	..
	1935	..	..	3·3	0·26	22·2	..	..	..	6·4	..	..	..
Eastern Command	1930-34	1·0	..	4·0	0·32	43·0	..	11·8	..	24·6	..	..	..
	1934	0·4	..	3·3	0·25	40·4	..	2·7	..	22·6	..	..	..
	1935	0·2	..	4·4	0·70	50·8	..	4·6	..	24·3	..	..	..
Southern Command	1930-34	2·8	..	3·1	0·24	37·8	..	12·0	..	19·0	..	..	..
	1934	1·1	..	2·6	0·20	34·5	..	13·3	..	12·5	..	..	..
	1935	1·1	..	3·6	0·14	38·3	..	5·9	..	8·7	..	..	..
Burma District	1930-34	1·0	..	2·8	0·22	102·3	..	63·2	..	1·9	..	0·1	0·11
	1934	..	..	2·2	..	84 3	..	82·7	..	0·6	..	..	..
	1935	0·6	..	0·6	..	79·4	0·55	57·4	..	..	..	..	..
All India	1930-34	1·9	..	4·0	0·35	37·7	..	9·5	..	41·4	..	0·0	0·00
	1934	0·8	..	3·9	0·20	34·2	..	6·6	..	36·2	..	..	..
	1935	0·7	..	4·2	0·40	38·8	0·02	5·0	..	36·5	..	..	..

A.—Admissions.

D.—Deaths.

TABLE XIII.

VACCINATION PERFORMED IN THE BRITISH AND INDIAN ARMIES DURING 1935—OFFICERS AND OTHER RANKS.

Commands.	British Troops.							
	Officers.				Warrant, and N. C. Officers and men.			
	Number.		Percentage of successful cases to total operations.		Number.		Percentage of successful cases to total operations.	
	P.	R.	P.	R.	P.	R.	P.	R.
Northern	..	218	..	94	4	3,421	100	87
Western	36	125	89	89	545	1,476	98	85
Eastern	..	172	..	80	4	4,654	100	65
Southern	22	286	100	77	160	3,829	91	66
Burma District	..	11	..	36	..	351	..	79
Total	58	812	93	83	713	13,731	97	73

Commands.	Indian Troops.											
	European officers.				Indian commissioned, Non-commissioned officers and men.				Follower.			
	Number.		Percentage of successful cases to total operations.		Number.		Percentage of successful cases to total operations.		Number.		Percentage of successful cases to total operations.	
	P.	R.	P.	R.	P.	R.	P.	R.	P.	R.	P.	R.
Northern	6	188	100	89	427	15,162	100	81	27	3,921	100	84
Western	..	54	..	91	..	3,914	..	96	...	664	..	86
Eastern	..	107	..	73	537	9,205	44	74	26	1,934	100	78
Southern	..	172	..	65	180	10,588	94	58	167	2,669	95	66
Burma District	..	13	..	77	100	1,060	90	79	13	142	77	59
Total	6	534	100	78	1,244	39,929	74	75	233	9,330	95	77

P.—Primary. R.—Revaccinations.

TABLE XIV.

VACCINATION PERFORMED IN THE FAMILIES—BRITISH ARMY DURING 1935.

Commands.	Women.				Children.			
	Number.		Percentage of successful cases to total operations.		Number.		Percentage of successful cases to total operations.	
	P.	R.	P.	R.	P.	R.	P.	R.
Northern	3	237	100	95	131	316	98	92
Western	59	75	98	79	116	65	95	80
Eastern	3	341	100	59	123	432	90	66
Southern	20	389	95	71	199	501	91	64
Burma District	..	57	..	70	18	104	100	91
Total	85	1,099	98	73	587	1,418	94	74

TABLE XV.

VACCINATION PERFORMED IN THE FAMILIES—INDIAN ARMY DURING 1935.

Commands.	Women.				Children.			
	Number.		Percentage of successful cases to total operations.		Number.		Percentage of successful cases to total operations.	
	P.	R.	P.	R.	P.	R.	P.	R.
Northern	6	57	100	75	14	25	100	64
Western	..	22	..	91	8	5	100	60
Eastern	30	86	93	69	55	67	100	70
Southern	..	83	..	72	2	64	100	66
Burma District	..	11	..	36	2	6	100	..
Total	36	259	94	72	81	167	100	65

SECTION II.

INDIAN ARMY, 1935.

TABLE B.

STATIONS BY COMMANDS AND INDEPENDENT DISTRICTS.

Stations.	Height above M. S. level in feet.*	Authority for height.	Points of reference.
Northern Command.			
Abbottabad	4,010	S. D.	Map.
Ambala	902	,,	S.B.M.
Amritsar	754	,,	,,
Bakloh	4,585	,,	Map.
Bannu	1,250	,,	,,
Campbellpore	1,180	,,	,,
Chitral	4,980	,,	,,
Dagshai	6,087	,,	,,
Dalhousie	7,687	,,	,,
Dera Ismail Khan	568	,,	S.B.M.
Dharamsala Cantt.	4,500	,,	Map.
Drosh Fort	4,340	,,	,,
Ferozepore	649	,,	S.B.M.
Jhelum	762	,,	,,
Jullundur Cantt.	771	,,	B.M.
Jutogh	6,370	,,	Map.
Kalabagh and Baragali	7,963	,,	,,
Kalabagh and Mari Indus	682	,,	,,
Kohat	1,725	,,	,,
Kuldana	7,049	S. G.	,,
Lahore Cantonment	706	S.D.	S.B.M.
Landikotal	3,509	,,	Map.
Lockhart Fort	6,613	,,	,,
Malakand	2,740	,,	,,
Manzai	1,650	,,	,,
Mardan	1,000	,,	,,
Mir Ali	2,240	S G.	V.G.L.
Mona	3,500	S.D.	Map.
Multan	404	,,	S.B.M.
Nowshera (Ry. Station)	966	,,	B.M.
Peshawar	1,152	,,	S.B.M.
Rawalpindi	1,689	,,	,,
Razmak	6,556	,,	Map.
Risalpur	1,014	,,	B.M.
Sargodha (Railway Rest House)	615	,,	,,
Sialkot	829	,,	,,
Solon	5,078	,,	,,
Subathu	4,000	,,	Map.
Thall	2,450	,,	,,
Wana	4,530	,,	V.G.L.
Shagai	3,174	..	B.M.
Western Command			
Chaman Fort	5,502	S.D.	Map.
Fort Sandeman	4,600	,,	,,
Hindubagh	5,821	,,	,,
Hyderabad (Sind)	96	,,	S.B.M.
Karachi (Holy Trinity Church)	28	,,	,,
Loralai	4,699	,,	Map.
Quetta	5,510	,,	S.B.M.
Sibi	436	,,	..
Eastern Command.			
Agra (Fort)	525	S.D.	S.B.M.
Alipore	17	,,	B.M.
Allahabad	314	,,	S.B.M.
Eastern Command—contd.			
Almora	5,494	S.D.	Map.
Bankura	..	..	..
Bareilly	563	S.D.	S.B.M.
Benares	256	,,	,,
Cawnpore	407	,,	B.M.
Chittagong	..	..	..
Comilla	..	..	..
Dacca	20	M.D.	..
Dehra Dun	2,232	S.D.	S.B.M.
Delhi	757	,,	,,
Dinapore	170	,,	Church.
Fategarh	467	,,	,,
Fyzabad	330	,,	S.B.M.
Ghoom	7,313	,,	Jn. of road.
Gyantse	13,120	,,	Map.
Gorakhpore	..	..	..
Jhansi	849	S.D.	S.B.M.
Lansdowne	5,823	,,	Map.
Lucknow	383	,,	B.M.
Meerut	737	,,	S.B.M.
Midnapore	..	..	..
Muttra	560	S.D.	S.B.M.
Mymensingh	..	..	..
Nowgong	735	S.D.	B.M.
Roorkee	879	,,	S.B.M.
Saidpur	..	..	..
Shillong	4,921	S.D.	Map.
Southern Command.			
Ahmedabad	162	S.D.	S.B.M.
Ahmednagar	2,180	,,	Map.
Aurangabad	1,905	M.D.	,,
Bangalore	3,002	S.D.	S.B.M.
Baroda	114	,,	B.M.
Belgaum	2,523	,,	S.B.M.
Bombay (town hall)	20	,,	,,
Cannanore	40	,,	..
Deolali	1,894	,,	S.B.M.
Jubbulpore	1,320	,,	,,
Kamptee (Rly. Station)	940	,,	B.M.
Mhow (Ry. Station)	1,887	,,	,,
Mount Abu (Sanitorium)	3,836	,,	..
Neemuch	1,613	,,	..
Nasirabad	1,461	,,	B.M.
Pachmarhi	3,490	,,	,,
Poona	1,867	,,	S.B.M.
Saugor	1,755	,,	,,
St. Thos. Mount (Ry. Station)	34	,,	B.M.
Madras (Obsy.)	250	,,	,,
Trichinopoly	256	,,	S.B.M.
Trimulgherry	1,843	,,	Map.
Wellington Stn. Hospl.	5,800	,,	,,
Burma District.			
Mandalay (Fort Dufferin)	246	S.D.	Map.
Maymyo	3,508	,,	,,
Mingaladon	118	,,	,,

* These heights are usually those of the survey-marks or of the mercury surface in barometer cisterns of meteorological observatories.

S. D. = Survey Department (Map Publication Office).
S. G. = Surveyor-General of India.
S.B.M. = Standard Bench Mark.
B.M. = G. T. Bench Mark.
V.G.L. = Village Ground Level.
Map. = Heights taken from Topo. Maps.
M.D. = Meteorological Department.

TABLE XVI.

INDIAN OFFICERS AND INDIAN OTHER RANKS.

ALL INDIA.

Table showing the average strength, admissions into hospital, deaths, numbers invalided and constantly sick, during the year 1935, with ratios per 1,000 of the strength.

Diseases.	Actuals.				Ratio per 1,000.			
	Admissions.	Deaths.	Invalids.	Average number constantly sick.	Admissions.	Deaths.	Invalids.	Constantly sick.
Average strength. . . . . 116,984.								
Specific diseases due to infection or infestation.								
Common cold	675	..	..	11·01	5·8	..	..	0·09
Diphtheria	3	..	..	0·19	0·0	..	..	0·00
Dysentery	1,424	2	1	52·55	12·2	0·02	0·01	0·45
Enteric fevers (inclusive of typhoid, para. A B & C and enteric group).	166	13	1	25·28	1·4	0·11	0·01	0·22
Erysipelas	10	..	..	0·45	0·1	..	..	0·00
Influenza	635	3	..	15·62	5·4	0·03	..	0·13
Malaria	14,728	9	3	358·81	125·9	0·08	0·03	3·07
Measles	260	..	..	12·41	2·2	..	..	0·11
Meningococcal infection	19	7	..	1·88	0·2	0·06	..	0·02
Mumps	799	..	..	39·91	6·8	..	..	0·34
Pneumonia	576	60	..	45·82	4·9	0·51	..	0·39
Pyrexia of uncertain origin	11	..	..	1·60	0·1	..	..	0·01
Rheumatic fever	96	..	3	7·77	0·8	..	0·03	0·07
Sandfly fever	882	..	..	14·60	7·5	..	..	0·12
Scarlet fever	1	..	..	0·10	0·0	..	..	0·00
Small pox	22	3	..	1·93	0·2	0·03	..	0·02
Tuberculosis { Pulmonary	219	15	194	24·75	1·9	0·13	1·66	0·21
Tuberculosis { Other	56	8	25	6·41	0·5	0·07	0·21	0·05
Venereal diseases { Gonorrhœa	543	1	4	58·27	4·6	0·01	0·03	0·50
Venereal diseases { Soft chancre	210	..	..	22·57	1·8	..	..	0·19
Venereal diseases { Syphilis	433	..	3	38·00	3·7	..	0·03	0·32
Venereal diseases { Other V. D. . . .	..	..	..	..	..	..	..	..

TABLE XVI—*contd.*

Diseases.	Actuals.				Ratio per 1,000.			
	Admissions.	Deaths.	Invalids.	Average number constantly sick.	Admissions.	Deaths.	Invalids.	Constantly sick.
Other diseases due to infection	952	13	21	49·01	8·1	0·11	0·18	0·42
Diseases due to infestation by Metazoan parasites — Scabies	1,126	..	..	33·78	9·6	..	..	0·29
Diseases due to infestation by Metazoan parasites — Other diseases	1,332	..	4	57·85	11·4	..	0·03	0·49
Other diseases classified under systems.								
Diseases of the nervous system	369	7	39	20·42	3·2	0·06	0·33	0·17
Mental diseases	93	..	30	6·79	0·8	..	0·26	0·06
Diseases of the eye	1,357	..	38	54·66	11·6	..	0·32	0·47
Diseases of the ear and nose	1,189	1	19	37·07	10·2	0·01	0·16	0·32
Diseases of the circulatory system. — Valvular diseases of the heart	14	1	13	1·66	0·1	0·01	0·11	0·01
Diseases of the circulatory system. — Disordered action of the heart	41	4	6	1·66	0·4	0·03	0·05	0·01
Diseases of the circulatory system. — Other diseases	47	8	8	3·23	0·4	0·07	0·07	0·03
Diseases of blood and blood forming organs	367	4	11	24·30	3·1	0·03	0·09	0·21
Diseases of ductless or endocrine glands.	22	..	1	1·07	0·2	..	0·01	0·01
Diseases of the breast	6	..	..	0·28	0·1	..	..	0·00
Diseases of the respiratory system. — Larynx and trachea	117	..	..	3·37	1·0	..	..	0·03
Diseases of the respiratory system. — Bronchi & bronchioles	1,397	..	10	47·92	11·9	..	0·09	0·41
Diseases of the respiratory system. — Other diseases	232	2	23	23·15	2·0	0·02	0·20	0·20
Diseases of the teeth and gums	338	..	1	8·91	2·9	..	0·01	0·08
Diseases of the digestive system. — Inflammation of the tonsils	609	..	3	15·17	5·2	..	0·03	0·13
Diseases of the digestive system. — Inflammation of pharynx	1,926	..	..	37·97	16·5	..	..	0·32
Diseases of the digestive system. — Inflammation of stomach	101	1	1	2·96	0·9	0·01	0·01	0·03
Diseases of the digestive system. — Gastric ulcer	1	1	..	0·03	0·0	0·01	..	0·00
Diseases of the digestive system. — Duodenal ulcer	10	1	1	0·83	0·1	0·01	0·01	0·01
Diseases of the digestive system. — Liver diseases	137	..	2	7·69	1·2	..	0·02	0·07
Diseases of the digestive system. — Other diseases	2,433	10	19	84·04	20·8	0·09	0·16	0·72
Diseases due to disorders of nutrition or of metabolism	19	..	5	1·83	0·2	..	0·04	0·02
Diseases of the generative system	308	..	2	13·24	2·6	..	0·02	0·11
Diseases of bones, joints, muscles, fasciæ and bursæ	1,067	1	34	49·56	9·1	0·01	0·29	0·42
Diseases of the areolar tissue	3,845	1	4	129·21	32·9	0·01	0·03	1·10
Diseases of the skin	1,438	1	3	59·34	12·3	0·01	0·03	0·51
Diseases of the urinary system	282	1	9	14·97	2·4	0·01	0·08	0·13

Injuries	General	41	25	..	1·20	0·4	0·21	..	0·01
	Local	6,209	37	101	292·00	58·1	0·32	0·86	2·50
	In action	15	3	..	1·36	0·1	0·03	..	0·01
Tumours and cysts		159	2	3	7·98	1·4	0·02	0·03	0·07
Poisons		30	5	..	0·75	0·3	0·04	..	0·01
No appreciable disease		55*	2	3	2·11	0·5	0·02	0·03	0·02
Suicides†		..	10	..	..	..	0·09	..	..
Total		49,452	252	648	1,837·30	422·7	2·15	5·54	15·71

* Includes 4 cases of malformations and 1 case of carrier (Typhoid fever).
† The figures against "Suicides" having already been shown under the heading of the injury, etc., which caused death, are not included in the total.

TABLE XVII.

INDIAN OFFICERS AND INDIAN OTHER RANKS.

NORTHERN COMMAND.

Table showing the average strength, admissions into hospital, deaths, numbers invalided and constantly sick, during the year 1935, with ratios per 1,000 of the strength.

Diseases. Average strength, 55,247.	Actuals.				Ratio per 1,000.			
	Admissions.	Deaths.	Invalids.	Average number constantly sick.	Admissions.	Deaths.	Invalids.	Constantly sick.
Specific Diseases due to infection or infestation.								
Common cold	196	...	...	3·25	3·5	...	...	0·06
Diphtheria	1	...	...	0·07	0·0	...	...	0·00
Dysentery	654	2	...	22·97	11·8	0·04	...	0·42
Enteric fever (inclusive of typhoid, para A, B & C, and enteric group).	87	5	...	12·60	1·6	0·09	...	0·23
Erysipelas	6	...	...	0·24	0·1	...	...	0·00
Influenza	298	2	...	6·84	5·4	0·04	...	0·12
Malaria	7,571	3	2	156·63	137·0	0·05	0·04	2·84
Measles	94	...	...	4·18	1·7	...	...	0·08
Meningococcal infection	18	7	...	1·11	0·2	0·13	...	0·02
Mumps	234	...	...	12·22	4·2	...	...	0·22
Pneumonia	282	36	...	22·26	5·1	0·65	...	0·40
Pyrexia of uncertain origin	8	...	...	1·04	0·1	...	...	0·02
Rheumatic fever	51	...	1	3·72	0·9	...	0·02	0·07
Sandfly fever	788	...	...	12·91	14·3	...	...	0·23
Scarlet fever.	...	...	...	...	...	...	...	...
Small-pox	9	1	...	0·80	0·2	0·02	...	0·01
Tuberculosis — Pulmonary	112	10	99	12·48	2·0	0·18	1·79	0·23
Tuberculosis — Other	29	4	14	2·69	0·5	0·07	0·25	0·05
Venereal diseases — Gonorrhœa	201	...	1	20·48	3·6	...	0·02	0·37
Venereal diseases — Soft chancre	78	...	...	7·07	1·4	...	...	0·13
Venereal diseases — Syphilis	135	...	1	12·08	2·4	...	0·02	0·22
Venereal diseases — Other V. D.	...	...	...	...	...	...	...	...

Other diseases due to infection	247	7	10	16·85	4·5	0·13	0·18	0·30
Diseases due to infestation by Metazoan parasites, { Scabies	554	...	...	16·74	10·0	...	...	0·30
{ Other diseases	423	...	2	23·55	7·7	...	0·04	0·43
Other Diseases classified under systems.								
Diseases of the nervous system	162	2	15	9·15	2·9	0·04	0·27	0·17
Mental diseases	41	...	10	2·93	0·7	...	0·18	0·05
Diseases of the :—								
Eye	639	...	15	23·50	11·6	...	0·27	0·43
Ear and nose	500	1	5	17·67	9·1	0·02	0·09	0·32
Diseases of the circulatory system. { Valvular diseases of the heart	3	1	2	0·32	0·1	0·02	0·04	0·01
{ Disordered action of the heart	22	1	3	0·96	0·4	0·02	0·05	0·02
{ Other diseases	24	3	2	1·72	0·4	0·05	0·04	0·03
Blood and blood forming organs	141	3	6	7·59	2·6	0·05	0·11	0·14
Diseases of ductless or endocrine glands	6	...	...	0·28	0·1	...	...	0·01
Diseases of the breast	4	...	...	0·13	0·1	...	...	0·00
Diseases of the respiratory system. { Larynx and trachea	59	...	...	1·59	1·1	...	...	0·03
{ Bronchi and bronchioles	641	...	2	21·60	11·6	...	0·04	0·39
{ Other diseases	131	1	12	12·30	2·4	0·02	0·22	0·22
Diseases of the teeth and gums	142	...	...	3·76	2·6	...	...	0·07
Diseases of the digestive system. { Inflammation of tonsils	274	...	...	6·79	5·0	...	...	0·12
{ Inflammation of pharynx	978	...	...	18·84	17·7	...	...	0·34
{ Inflammation of stomach	49	1	...	1·11	0·9	0·02	...	0·02
{ Gastric ulcer	...	...	...	...	...	...	...	...
{ Duodenal ulcer	3	...	...	0·26	0·1	...	...	0·00
{ Liver diseases	42	...	1	2·56	0·8	...	0·02	0·05
{ Other diseases	1,194	4	8	39·42	21·6	0·07	0·14	0·71
Diseases due to disorders of nutrition or of metabolism	10	...	...	0·56	0·2	...	...	0·01
Diseases of the generative system	139	...	1	5·71	2·5	...	0·02	0·10
Diseases of bones, joints, muscles, fasciæ and bursæ	460	1	11	22·21	8·3	0·02	0·20	0·40
Diseases of the areolar tissue	1,682	1	...	55·71	30·4	0·02	...	1·01
Diseases of the skin	640	...	2	25·44	11·6	...	0·04	0·46
Diseases of the urinary organs	140	...	4	7·28	2·5	...	0·07	0·13
Injuries { General	21	6	...	0·60	0·4	0·11	...	0·01
{ Local	2,807	13	30	129·74	50·8	0·22	0·54	2·35
{ In action	15	3	...	1·36	0·3	0·05	...	0·02
Tumours and cysts	87	1	1	4·87	1·6	0·02	0·02	0·09
Poisons	12	3	...	0·41	0·2	0·05	...	0·01
No appreciable disease	†22	...	2	0·59	0·4	...	0·04	0·01
Suicides*	...	5	...	...	...	0·09	...	...
Total	23,161	122	262	799·77	419·2	2·21	4·74	14·46

* The figures against "Suicides" having already been shown under the heading of the injury, etc., which caused death, are not included in the total.
† Includes 3 cases of malformations.

TABLE XVIII.

INDIAN OFFICERS AND INDIAN OTHER RANKS.

WESTERN COMMAND.

Table showing the average strength, admissions into hospital, deaths, numbers invalided and constantly sick, during the year 1935, with ratios per 1,000 of the strength.

Diseases. Average strength, 13,482.	Actuals.				Ratio per 1,000.			
	Admissions.	Deaths.	Invalids. sent home.	Average number constantly sick.	Admissions.	Deaths.	Invalids. sent home.	Average number constantly sick.
Specific Diseases due to infection or infestation.								
Common cold	130	..	..	2·28	9·6	..	..	0·17
Diphtheria	..	..	..	..	..	..	..	..
Dysentery	128	..	1	4·40	9·5	..	0·07	0·33
Enteric fever (inclusive of typhoid, para. A, B & C and enteric group).	18	1	1	3·04	1·3	0·07	0·07	0·23
Erysipelas	3	..	..	0·16	0·2	..	..	0·01
Influenza	62	1	..	1·49	4·6	0·07	..	0·11
Malaria	2,360	3	..	73·56	175·0	0·22	..	5·46
Measles	44	..	..	2·14	3·3	..	..	0·16
Meningococcal infection	1	..	..	0·18	0·1	..	..	0·01
Mumps	150	..	..	7·96	11·1	..	..	0·59
Pneumonia	74	11	..	5·37	5·5	0·82	..	0·40
Pyrexia of uncertain origin	..	..	..	..	..	..	..	..
Rheumatic fever	9	..	..	0·59	0·7	..	..	0·04
Sandfly fever	39	..	..	0·65	2·9	..	..	0·05
Scarlet fever.	..	..	..	..	..	..	..	..
Small-pox	2	..	..	0·13	0·1	..	..	0·01
Tuberculosis — Pulmonary	16	..	14	2·47	1·2	..	1·04	0·18
Tuberculosis — Other	11	2	3	1·60	0·8	0·15	0·22	0·12
Venereal diseases — Gonorrhoea	19	..	..	2·11	1·4	..	..	0·16
Venereal diseases — Soft chancre	27	..	..	3·08	2·0	..	..	0·23
Venereal diseases — Syphilis	20	..	..	1·79	1·5	..	..	0·13
Venereal diseases — Other V. D.	..	..	..	..	..	..	..	..
Other diseases due to infection	67	..	4	4·41	5·0	..	0·30	0·33
Diseases due to infestation by Metazoan parasites — Scabies	64	..	..	2 03	4·7	..	..	0·15
Diseases due to infestation by Metazoan parasites — Other diseases	80	..	..	3·30	5·9	..	..	0·24

Other diseases classified under systems.

Diseases of the nervous system	34	1	4	1·90	2·5	0·07	0·30	0·14
Mental diseases	12	..	3	0·89	0·9	..	0·22	0·07
Diseases of the eye	74	..	4	3·00	5·5	..	0·30	0·22
Diseases of the ear and nose	73	..	2	2·28	5·4	..	0·15	0·17
Diseases of the circulatory system. — Valvular diseases of the heart	4	..	3	0·46	0·3	..	0·22	0·03
Diseases of the circulatory system. — Disordered action of the heart	3	1	1	0·08	0·2	0·07	0·07	0·01
Diseases of the circulatory system. — Other diseases	4	1	..	0·14	0·3	0·07	..	0·01
Diseases of the blood and blood forming organs	57	..	1	3·42	4·2	..	0·07	0·25
Diseases of the ductless or endocrine glands	1	..	..	0·11	0·1	..	..	0·01
Diseases of the breast	..	..	..	..	..	..	..	..
Diseases of the respiratory system. — Larynx and trachea	15	..	..	0·49	1·1	..	..	0·04
Diseases of the respiratory system. — Bronchi and bronchioles	164	..	1	5·65	12·2	..	0·07	0·42
Diseases of the respiratory system. — Other diseases.	19	..	..	1·38	1·4	..	..	0·10
Diseases of the teeth and gums	36	..	..	0·96	2·7	..	..	0·07
Diseases of the digestive system. — Inflammation of tonsils	63	..	..	1·59	4·7	..	..	0·12
Diseases of the digestive system. — Inflammation of pharynx	264	..	..	5·71	19·6	..	..	0·42
Diseases of the digestive system. — Inflammation of stomach	5	..	..	0·13	0·4	..	..	0·01
Diseases of the digestive system. — Gastric ulcer	..	..	..	..	..	..	..	..
Diseases of the digestive system. — Duodenal ulcer	..	..	..	..	..	..	..	..
Diseases of the digestive system. — Liver diseases	7	..	..	0·18	0·5	..	..	0·01
Diseases of the digestive system. — Other diseases	215	2	3	6·84	15·9	0·15	0·22	0·51
Diseases due to disorders of nutrition or of metabolism	1	..	1	0·03	0·1	..	0·07	0·00
Diseases of the generative system	29	..	..	1·45	2·2	..	..	0·11
Diseases of bones, joints, muscles, fasciæ, and bursæ	116	..	5	4·71	8·6	..	0·37	0·35
Diseases of the areolar tissue	192	..	1	6·81	14·2	..	0·07	0·51
Diseases of the skin	139	..	..	5·76	10·3	..	..	0·43
Diseases of the urinary system	20	..	1	0·82	1·5	..	0·07	0·06
Injuries — General	2	13	..	0·14	0·1	0·96	..	0·01
Injuries — Local	522	7	14	25·17	38·7	0·52	1·04	1·87
Injuries — In action.	..	..	..	..	..	..	..	..
Tumours and cysts	11	1	1	0·53	0·8	0·07	0·07	0·04
Poisons	..	..	..	..	..	..	..	..
No appreciable disease	8	..	..	0·41	0·6	..	..	0·03
Suicides*	..	..	..	..	..	..	..	..
Total	5,414	44	68	203·78	401·6	3·26	5·04	15·11

* The figures against "suicides" having already been shown under the heading of the injury, etc, which caused death, are not included in the total.

TABLE XIX.

INDIAN OFFICERS AND INDIAN OTHER RANKS.

EASTERN COMMAND.

Table showing the average strength, admissions into hospital, deaths, numbers invalided and constantly sick, during the year 1935, with ratios per 1,000 of the Strength.

Diseases.	Actuals.				Ratio per 1,000.			
	Admissions.	Deaths.	Invalids sent home.	Average number constantly sick.	Admissions.	Deaths.	Invalids sent home.	Average number constantly sick.
Average strength, 23,744.								
Specific diseases due to infection or infestation.								
Common cold	197	...	...	3·46	8·3	...	...	0·15
Diphtheria	...	...	...	...	...	...	...	...
Dysentery	302	...	...	12·15	12·7	...	...	0·51
Enteric fever (inclusive of typhoid, para. A, B & C. and enteric group)	36	3	...	6·24	1·5	0·13	...	0·26
Erysipelas	...	...	...	...	...	...	...	...
Influenza	154	...	...	3·52	6·5	...	...	0·15
Malaria	2,642	2	...	73·59	111·3	0·08	...	3·10
Measles	95	...	...	4·72	4·0	...	...	0·20
Meningococcal infection	3	...	...	0·35	0·1	...	...	0·01
Mumps	337	...	...	15·41	14·2	...	...	0·65
Pneumonia	139	6	...	12·83	5·9	0·25	...	0·54
Pyrexia of uncertain origin	1	...	...	0·23	0·0	...	...	0·01
Rheumatic fever	11	...	1	1·06	0·5	...	0·04	0·04
Sandfly fever	33	...	...	0·67	1·4	...	...	0·03
Scarlet fever	1	...	...	0·10	0·0	...	...	0·00
Small-pox	9	...	...	0·78	0·4	...	...	0·03
Tuberculosis — Pulmonary	62	4	53	6·74	2·6	0·17	2·23	0·28
Tuberculosis — Other	15	2	7	2·00	0·6	0·03	0·29	0·08
Venereal diseases — Gonorrhœa	177	...	2	21·04	7·5	...	0·08	0·89
Venereal diseases — Soft chancre	46	...	...	6·51	1·9	...	...	0·27
Venereal diseases — Syphilis	123	...	1	11·20	5·2	...	0·04	0·47
Venereal diseases — Other V. D.	...	...	...	...	...	...	...	...

Other diseases due to infection	146	4	3	10·44	6·1	0·17	0·18	0·44
Diseases due to infestation by Metazoan parasites. Scabies	296	...	...	8·26	12·5	...	...	0·35
Diseases due to infestation by Metazoan parasites. Other diseases	201	...	...	11·03	8·5	...	...	0·46
Other diseases classified under systems.								
Diseases of the nervous system	88	1	6	4·35	3·7	0·04	0·25	0·18
Mental diseases	18	...	4	0·92	0·8	...	0·17	0·04
Diseases of the eye	393	...	11	17·31	16·6	...	0·46	0·73
Diseases of the ear and nose	292	...	3	8·87	12·3	...	0·13	0·37
Diseases of the Circulatory system. Valvular disease of the heart	1	...	2	0·41	0·0	...	0·13	0·02
Diseases of the Circulatory system. Disordered action of the heart	6	...	2	0·28	0·3	...	0·08	0·01
Diseases of the Circulatory system. Other diseases	5	1	3	0·42	0·2	0·04	0·13	0·02
Blood and blood forming organs	73	1	3	5·80	3·1	0·04	0·13	0·24
Diseases of ductless or endocrine glands	14	...	1	0·58	0·6	...	0·04	0·02
Diseases of the breast	2	...	...	0·15	0·1	...	...	0·01
Diseases of the respiratory system. Larynx and trachea	27	...	...	0·96	1·1	...	...	0·04
Diseases of the respiratory system. Bronchi and bronchioles.	296	...	3	10·88	12·5	...	0·13	0·46
Diseases of the respiratory system. Other diseases	46	...	5	5·16	1·9	...	0·21	0·22
Diseases of the teeth and gums	84	...	1	2·19	3·5	...	0·04	0·22
Diseases of the digestive system. Inflammation of the tonsils	131	...	1	3·28	5·5	...	0·04	0·14
Diseases of the digestive system. Inflamation of pharynx	321	...	...	6·56	13·5	...	...	0·28
Diseases of the digestive system. Inflamation of stomach	19	...	...	0·62	0·8	...	...	0·03
Diseases of the digestive system. Gastric ulcer	...	...	...	0·01	...	...	...	0·00
Diseases of the digestive system. Duodenal ulcer	4	...	1	0·45	0·2	...	0·04	0·02
Diseases of the digestive system. Liver diseases	47	1	...	2·73	2·0	0·04	..	0·11
Diseases of the digestive system. Other diseases	562	1	5	21·36	23·7	0·04	0·21	0·90
Diseases due to disorders of nutrition or of metabolism	3	...	3	0·65	0·1	...	0·13	0·03
Diseases of the generative system	76	...	...	3·48	3·2	...	...	0·15
Diseases of bones, joints, muscles, fasciæ and bursae	222	...	10	10·23	9·3	...	0·42	0·43
Diseases of the areolar tissue	966	...	2	23·63	40·7	...	0·08	1.42
Diseases of the skin	351	...	...	13·48	14·8	...	...	0·57
Diseases of the urinary system	53	...	3	3·70	2·2	...	0·13	0·16
Injuries General	11	3	...	0·29	0·5	0·13	...	0·01
Injuries Local	1,423	8	27	72·27	59·9	0·34	1·14	3·04
Injuries In action	...	...	...	...	...	...	...	..
Tumours and cysts	23	...	...	1·26	1·0	...	...	0·05
Poisons	8	2	...	0·14	0·3	0·08	...	0·01
No appreciable disease	13	2†	...	0·44	0·5	0·08	...	0·02
Suicides*	...	2	...	...	...	0·08	...	...
Total	10,604	41	164	445·19	446·6	1·73	6·91	18·75

* The figures against "Suicides" having already been shown under the heading of the injury, etc., which caused death, are not included in the total.

† Cause unknown.

TABLE XX.

INDIAN OFFICERS AND INDIAN OTHER RANKS.

SOUTHERN COMMAND.

Table showing the average strength, admissions into hospital, deaths, numbers invalided and constantly sick, during the year 1935, with ratios per 1,000 of the strength.

Diseases.	Actuals.				Ratio per 1,000.			
	Admissions.	Deaths.	Invalids.	Average number constantly sick.	Admissions.	Deaths.	Invalids.	Constantly sick.
Average strength, 21,450.								
Specific diseases due to infection or infestation.								
Common cold	150	...	...	1·96	7·0	...	...	0·09
Diphtheria	2	...	...	0·12	0·1	...	...	0·01
Dysentery	278	...	...	10·09	13·0	...	...	0·47
Enteric fever (inclusive of typhoid, para. A, B & C, and enteric group)	23	4	...	2·76	1·1	0·19	...	0·13
Erysipelas	1	...	...	0·05	0·0	...	...	0·00
Influenza	118	...	...	3·69	5·5	...	...	0·17
Malaria	1,730	...	1	42·94	80·7	...	0·05	2·00
Measles	13	...	...	0·60	0·6	...	...	0·03
Meningococcal infection	2	...	...	0·24	0·1	...	...	0·01
Mumps	77	...	...	4·27	3·6	...	...	0·20
Pneumonia	66	7	...	4·42	3·1	0·33	...	0·21
Pyrexia of uncertain origin	1	...	...	0·15	0·0	...	...	0·01
Rheumatic fever	25	...	1	2·40	1·2	...	0·05	0·11
Sandfly fever	22	...	...	0·37	1·0	...	...	0·02
Scarlet fever	...	...	...	...	...	...	...	...
Small-pox	2	2	...	0·22	0·1	0·09	...	0·01
Tuberculosis — Pulmonary	22	...	22	2·63	1·0	...	1·03	0·12
Tuberculosis — Other	1	...	1	0·12	0·0	...	0·05	0·01
Venereal diseases — Gonorrhœa	75	1	...	6·75	3·5	0·05	...	0·31
Venereal diseases — Soft chancre	39	...	...	3·50	1·8	...	...	0·16
Venereal diseases — Syphilis	87	...	1	7·83	4·1	...	0·05	0·36
Venereal diseases — Other V. D.	...	...	...	...	...	...	...	...

Other diseases due to infection		341	2	4	13·19	15·9	0·09	0·19	0·25
Diseases due to infestation by Metazoan parasities.	Scabies	165	...	...	5·26	7·7	...	...	0·61
	Other diseases	568	...	2	17·95	26·5	...	0·09	0·84
Other diseases classified under systems.									
Diseases of the nervous system		60	3	12	3·86	2·8	0·14	0·56	0·18
Mental diseases		18	...	12	1·45	0·8	...	0·56	0·07
Diseases of the eyes		224	...	8	9·04	10·4	...	0·37	0·42
Diseases of the ear and nose		203	...	9	5·89	9·5	...	0·42	0·27
Diseases of the circulatory system.	Valvular diseases of the heart	2	...	2	0·12	0·1	...	0·09	0·01
	Disordered action of the heart	9	2	...	0·27	0·4	0·09	...	0·01
	Other diseases	14	1	3	0·95	0·7	0·05	0·14	0·04
Diseases of the blood and blood forming organs		63	...	1	4·31	2·9	...	0·05	0·20
Diseases of ductless or endocrine glands		1	...	...	0·10	0·0	...	...	0·00
Diseases of the breast		...	...	...	...	...	...	...	...
Diseases of the respiratory system.	Larynx and trachea	10	...	...	0·19	0·5	...	...	0·01
	Bronchi and bronchioles	242	...	4	7·43	11·3	...	0·19	0·35
	Other diseases	21	1	4	1·91	1·0	0·05	0·19	0·09
Diseases of the teeth and gums		52	...	...	1·47	2·4	...	...	0·07
Diseases of the digestive system.	Inflammation of tonsils	117	...	2	3·05	5·5	...	0·09	0·14
	Inflamation of pharynx	192	...	...	3·98	9·0	...	...	0·19
	Inflamation of stomach	23	...	1	1·03	1·1	...	0·05	0·05
	Gastric ulcer	...	...	...	...	...	...	...	...
	Duodenal ulcer	2	1	...	0·07	0·1	0·05	...	0·00
	Liver diseases	33	...	1	1·80	1·5	...	0.05	0·08
	Other diseases	366	2	3	13·29	17·1	0·09	0·14	0·62
Diseases due to disorders of nutrition or of metabolism		3	...	1	0·47	0·1	...	0·05	0·02
Diseases of the generative system		39	...	1	1·48	1·8	...	0·05	0·07
Diseases of bones, joints, muscles, fasciæ and bursæ		220	...	6	9·69	10·3	...	0·28	0·45
Diseases of the areolar tissue		882	...	1	28·28	41·1	...	0·05	1·32
Diseases of the skin		226	...	1	11·07	10·5	...	0·05	0·52
Diseases of the urinary system		64	...	1	2·87	3·0	...	0·05	0·13
Injuries	General	3	2	...	0·05	0·1	0·09	...	0·00
	Local	1,233	6	26	55·90	57·5	0·28	1·21	2·61
	In action	...	...	...	...	...	...	...	...
Tumours and cysts		33	...	1	1·21	1·5	...	0·05	0·06
Poisons		7	...	...	0·11	0·3	...	...	0·01
No appreciable disease		8†	...	1	0·41	0·4	...	0·05	0·02
Suicides*		...	2	...	...	...	0·09	...	...
	Total	8,178	34	133	303·16	381·3	1·59	6·20	14·3

* The figures against "Suicides" having already been shown under the heading of the injury, etc, which caused death, are not included in the total,
† Includes 1 case of typhoid carrier.

TABLE XXI.

INDIAN OFFICERS AND INDIAN OTHER RANKS.

BURMA DISTRICT.

Table showing the average strength, admissions into hospital, deaths, numbers invalided and constantly sick during the year 1935, with ratios per 1,000 of the strength.

Diseases. Average strength, 3,061.	Actuals.				Ratio per 1,000.			
	Admissions.	Deaths.	Invalids sent home.	Average number constantly sick.	Admissions.	Deaths.	Invalids sent home.	Average number constantly sick.
Specific diseases due to infection or infestation.								
Common cold	2	...	...	0·06	0·7	...	...	0·02
Diphtheria	...	...	...	...	...	...	...	...
Dysentery	62	...	...	2·94	20·3	...	...	0·96
Enteric fever (inclusive of typhoid, para. A, B, & C, and enteric group).	2	...	...	0·64	0·7	...	...	0·21
Erysipelas	...	...	...	...	...	...	...	...
Influenza	3	...	...	0·08	1·0	...	...	0·03
Malaria	425	1	...	12·09	138·8	0·33	...	3·95
Measles	14	...	...	0·77	4·6	...	...	0·25
Meningococcal infection	...	...	...	...	...	...	...	...
Mumps	1	...	...	0·05	0·3	...	...	0·02
Pneumonia	15	...	...	0·94	4·9	...	...	0·31
Pyrexia of uncertain origin	1	...	...	0·18	0·3	...	...	0·06
Rheumatic fever	...	...	...	...	...	...	...	...
Sandfly fever	...	...	...	...	...	...	...	...
Scarlet fever	...	...	...	...	...	...	...	...
Small-pox	...	...	...	...	...	...	...	...

Tuberculosis — Pulmonary	7	1	6	0·53	2·3	0·33	1·96	0·17
Tuberculosis — Other	...	...	...	...	...	...	...	...
Venereal diseases — Gonorrhœa	71	...	1	7·89	23·2	...	0·33	2·58
Venereal diseases — Soft chancre	20	...	...	2·41	6·5	...	...	0·79
Venereal diseases — Syphilis	68	...	...	5·10	22·2	...	...	1·67
Venereal diseases — Other V. D.	...	...	...	...	...	...	...	...
Other diseases due to infection	151	...	...	4·12	49·3	...	...	1·35
Diseases due to infestation by Metazoan parasites — Scabies	47	...	...	1·49	15·4	...	...	0·49
Diseases due to infestation by Metazoan parasites — Other diseases	60	...	...	2·02	19·6	...	...	0·66
Other diseases classified under systems.								
Diseases of the nervous system	25	...	2	1·16	8·2	...	0·65	0·38
Mental diseases	4	...	1	0·60	1·3	...	0·33	0·20
Diseases of the Eye	27	...	...	1·81	8·8	...	...	0·59
Diseases of the Ear and nose	121	...	...	2·36	39·5	...	...	0·77
Circulatory system — Valvular diseases of the heart	4	...	3	0·35	1·3	...	0·98	0·11
Circulatory system — Disordered action of the heart	1	...	...	0·07	0·3	...	...	0·02
Circulatory system — Other diseases	...	2	...	...	...	0·65	...	...
Blood and blood forming organs	33	...	...	3·18	10·8	...	...	1·04
Ductless or endocrine glands	...	...	...	...	...	...	...	...
Breast	...	...	...	...	...	...	...	...
Respiratory system — Larynx and trachea	6	...	...	0·14	2·0	..	...	0·05
Respiratory system — Bronchi and bronchioles	54	...	...	2·36	17·6		...	0·77
Respiratory system — Other diseases	15	...	2	2·40	4·9	...	0·65	0·78
Teeth and gums	24	...	...	0·53	7·8	...	...	0·17
Diseases of the digestive system — Inflammation of the tonsils	24	...	...	0·46	7·8	...	...	0·15
Diseases of the digestive system — Inflammation of pharynx	171	...	...	2·88	55·9	...	...	0·94
Diseases of the digestive system — Inflammation of stomach	5	...	...	0·07	1·6	...	...	0·02
Diseases of the digestive system — Gastric ulcer	1	1	...	0·02	0·3	0·33	...	0·01
Diseases of the digestive system — Duodenal ulcer	1	...	...	0·05	0·3	...	...	0·02
Diseases of the digestive system — Liver	9	...	...	0·47	2·9	...	...	0·15
Diseases of the digestive system — Other diseases	95	...	...	3·05	31·0	...	...	1·00
Diseases due to disorders of nutrition or of metabolism	2	...	...	0·12	0·7	...	...	0·04
Diseases of the generative system	25	...	...	1·12	8·2	...	...	0·37
Diseases of the bones, joints, muscles, fasciæ and bursæ	49	...	2	2·72	16·0	...	0·65	0·89

TABLE XXI—*contd.*

BURMA DISTRICT—*contd.*

Table showing the average strength, admissions into hospital, deaths, numbers invalided and constantly sick, during the year 1935, with ratios per 1,000 of the strength—contd.

Diseases.	Actuals.				Ratio per 1,000.			
	Admissions.	Deaths.	Invalids.	Average number constantly sick.	Admissions.	Deaths.	Invalids.	Constantly sick.
Average strength, 3,061.								
Other diseases classified under systems—contd.								
Diseases of the :—								
Areolar tissue	123	...	...	4·78	40·2	...	...	1.46
Skin	82	1	...	3·59	26·8	0·33	...	1·17
Urinary system	5	1	...	0·30	1·6	0·33	...	0·10
Injuries { General	4	1	...	0·12	1·3	0·33	...	0·04
Injuries { Local	224	3	4	8·92	73·2	0·98	1·31	2·91
Injuries { In action	...	...	...	...	...	...	...	...
Tumours and cysts	5	...	...	0·11	1·6	...	...	0·04
Poisons	3	...	...	0·09	1·0	...	...	0·03
No appreciable disease	4†	...	...	0·26	1·3	...	...	0·08
Suicides*	...	1	...	...	...	0·33	...	...
Total	2,095	11	21	85·40	684·4	3·59	6·86	27·90

* The figures against "Suicides" having already been shown under the heading of the injury, etc., which caused death, are not included in the total.

† Includes one case of malformation.

TABLE XXII.

INDIAN OFFICERS AND INDIAN OTHER RANKS.

Table showing monthly ratios per 1,000 of strength of admissions for certain diseases for All-India during the year 1935.

	Enteric group of fevers.	Influenza.	Cholera.	Small-pox.	Malaria.	Dysentery protozoal.	Dysentery bacillary.	Dysentery bacillary exudate.	Dysentery group.	Pyrexia of uncertain origin.	Pneumonia lobar and lobular.	Diarrhœa.	Dengue.	Sand-fly fever.	Plague.	Effects of heat.	All causes.
January	0·1	1·0	...	0·0	2·9	...	0·2	0·1	0·1	0·0	0·6	0·3	0·3	...	0·0	...	27·7
February	0·0	0·4	...	0·0	2·1	0·0	0·1	0·1	0·1	...	0·4	0·1	0·3	...	...	...	21·4
March	0·1	0·4	...	0·0	1·9	0·1	0·2	0·2	0·1	0·0	0·4	0·3	0·2	0·0	...	...	23·4
April	0·1	0·8	...	0·0	2·2	0·0	0·4	0·3	0·4	..	0·4	0·4	0·1	0·2	...	0·0	26·2
May	0·1	0·3	...	0·0	4·2	0·0	0·5	0·5	0·6	0·0	0·3	0·9	0·1	0·9	...	0·1	30·6
June	0·2	0·2	...	0·0	6·7	0·1	0·6	0·4	0·5	0·0	0·3	0·8	0·2	1·0	...	0·1	30·8
July	0·2	0·2	...	...	9·8	0·0	0·5	0·3	0·3	0·0	0·3	0·5	0·4	2·3	...	...	37·9
August	0·2	0·2	0·0	...	23·1	0·0	0·6	0·6	0·3	...	0·3	0·6	0·6	1·4	...	...	51·0
September	0·2	0·3	...	...	30·7	0·0	0·6	0·4	0·3	0·0	0·3	0·6	0·6	1·3	...	...	59·8
October	0·1	0·2	...	0·0	21·9	0·1	0·6	0·2	0·2	...	0·3	0·5	0·5	0·5	...	...	47·6
November	0·1	0·3	...	0·0	16·4	0·0	0·4	0·3	0·2	...	0·5	0·4	0·1	0·2	...	...	40·5
December	0·1	1·1	...	0·0	5·9	0·0	0·3	0·2	0·2	...	0·6	0·3	0·1	0·0	...	...	29·1
Total	1·3	5·4	0·0	0·2	126·0	0·4	5·0	3·5	3·2	0·1	4·9	5·6	3·4	7·6	0·0	0·1	423·2

TABLE

INDIAN OFFICERS AND

Table showing ratios per 1,000 of strength of admissions for certain

Stations and Districts.	Average annual strength.	Enteric group of fevers.					Dysentery.			
		Typhoid fever.	Para. A.	Para. B.	Para. C.	Enteric group.	Bacillary.	Bacillary exudate.	Protozoal.	Clinical.
Chitral	151	..	..	..	..	..	..	..	..	..
Drosh	830	..	..	..	..	..	..	..	..	..
Landikotal	1,820	..	..	..	..	0·5	6·0	6·6	0·5	17·0
Malakand	675	..	..	..	..	..	..	..	1·5	5.9
Mardan	1,034	1·0	..	..	..	..	..	3·9	..	5·8
Nowshera	2,953	..	0·3	..	..	2·7	0·7	2·7	..	8·8
Peshawar	5,186	0·8	0 4	..	..	0·4	5·4	9·3	..	6·7
Shagai	806	..	..	..	..	..	2·5	1·2	..	5·0
Risalpur	637	..	..	..	..	1·6	..	..	..	..
Total Peshawar Distt.	14,092	0·4	0·2	..	..	0·9	3·1	5·2	0·1	7·5
Fort Lockhart	318	..	..	..	..	..	3·1	3·1	..	..
Kohat	4,178	0·2	0·2	0·2	..	0·2	11·2	0·7	..	5·0
Thal	966	..	..	..	..	..	1·0	..	..	..
Total Kohat District	5,462	0·2	0·2	0·2	...	0·2	9·0	0·7	..	3·8
Abbottabad	4,000	0·2	..	..	..	0·5	1·2	1·5	..	0·7
Campbellpore	205	..	..	..	..	..	..	4·9	..	..
Jhelum	2,254	0·4	..	..	..	0·9	6·7	8·9	..	5·3
Kalabagh (Hazara)	100	..	..	..	..	..	..	..	..	..
Kuldana	179	..	..	..	..	..	..	5·6	5·6	..
Mona	43	..	..	..	..	..	..	..	..	..
Sargodha	48	..	..	..	..	..	..	..	..	..
Rawalpindi	4,240	0·2	0·9	..	..	0·9	3·8	10·6	..	5·4
Total Rawalpindi District	11,069	0·3	0·4	..	..	0·7	3·3	6·6	0·1	3·4
Ambala	2,291	0·4	..	..	..	0·4	3·1	1·3	0·4	2·2
Amritsar	146	..	..	..	..	..	..	6·8	..	6·8
Bakloh	711	1·4	..	..	..	....	..	..	4·2	2·8
Dagshai	8	..	..	..	..	..	..	..	..	..
Dalhousie	12	..	..	..	..	..	..	..	..	..
Dharamsala	760	2·6	..	..	..	..	3·9	5·3	..	5·3
Ferozepore	1,820	0·5	1·1	..	..	..	1·6	2·2	..	2·2
Jullundur	1,999	3·0	1·5	..	..	2·0	2·0	3·0	2·0	4·5
Jutogh	210	..	..	..	..	..	4·8	..	..	..
Lahore	2,336	0·9	2·1	..	..	..	1·3	5·6	..	2·1
Multan	598	1·7	..	..	..	..	..	3·3	..	1·7
Sialkot	2,032	..	..	..	..	..	0·5	..	1·4	2·0
Solon	3	..	..	..	..	..	..	..	..	..
Subathu	7	..	..		..	..	..	..	..	..

XXIII.

INDIAN OTHER RANKS.

diseases in each Station and District in India during the year 1935.

Colitis.	Diarrhœa.	Cholera.	Venereal diseases.	Small-pox.	Malaria.	Dengue.	Sand-fly fever.	Plague.	Influenza.	Pneumonia lobar and lobular.	Heat-stroke.	Heat-exhaustion.	All causes.	Average number constantly sick.
..	13·2	..	..	..	13·2	..	39·7	..	..	..	..	..	225·2	5·63
..	8·4	..	2·4	..	49·4	..	12·0	..	8·4	1·2	..	..	214·5	8·23
..	3·3	..	4 4	0·5	93·9	..	131·3	..	64·3	4·4	..	..	493·4	14·15
..	3·0	..	3·0	..	154·1	..	41·5	..	..	4·4	..	..	370·4	9·57
..	2·9	..	3·9	..	252·4	..	12·6	..	23·2	4·8	..	1·9	549·3	14·84
..	8·1	..	6·4	..	98·5	..	4·4	..	6·1	3·7	..	0·7	438·5	15·39
..	6·4	..	10·4	0·2	148·1	..	15·2	..	0·2	6·4	..	..	389·1	14·34
..	2·5	..	8·7	..	274·2	..	11·2	..	9·9	7·4	..	1·2	466·5	8·09
1·6	9·4	..	6·3	1·6	76·9	..	33·0	..	..	7·8	..	1·6	397·2	10·03
0·1	6·0	..	7·1	0·2	135·4	..	29·7	..	12·4	5·1	..	0·4	416·5	13·34
3·1	..	..	3·1	..	116·4	..	..	..	3·1	18·9	..	..	345·9	9·21
0·2	8·6	..	6·9	..	143·8	..	10·8	..	..	3·8	..	..	358·5	12·37
..	12·4	..	5·2	..	254·7	..	4·1	..	1·0	2·1	..	..	383·0	9·18
0·4	8·8	..	6·4	..	161·8	..	9·0	..	0·4	4·4	..	..	362·1	11·63
0·2	9·0	..	3·7	..	68·0	..	..	..	..	5·0	..	..	406·5	12·64
..	..	..	19·5	..	112·2	..	14·6	..	..	4·9	..	..	287·8	6·73
..	4·4	..	5·8	..	239·1	..	9·3	..	..	6·2	..	..	535·9	15·81
..	10·0	..	20·0	..	50·0	..	10·0	..	..	10·0	..	..	320·0	12·20
..	11·2	..	..	..	22·3	..	..	..	..	..	..	..	167·6	19·05
..	23·3	..	..	..	255·8	..	46·5	..	..	..	..	..	1,279·1	24·88
..	62·5	..	..	..	104·2	..	..	..	166·7	..	..	..	937·5	13·33
..	5·9	..	8·3	..	84·9	..	14·9	..	..	4·7	..	..	376·2	16·03
0·1	7·0	..	6·2	..	110·1	..	8·1	..	0·7	5·1	..	..	420·2	14·62
..	4·4	..	5·2	..	90·4	..	1·3	..	0·9	2·2	..	..	347·4	14·62
..	20·5	..	13·7	..	226·0	..	20·5	..	..	..	..	..	568·5	19·25
..	1·4	..	4·2	..	174·4	..	14·1	..	..	9·8	..	..	429·0	15·06
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	83·3	..	..	..	..	..	..	..	186·6	58·33
..	2·6	..	5·3	..	209·2	..	..	..	..	22·4	..	..	492·1	14·42
..	4·4	..	11·5	..	107·7	..	8·8	..	37·9	1·6	..	..	425·3	13·47
..	1·0	..	8·0	1·0	153·6	..	19·0	..	..	4·5	..	..	352·7	12·10
14·3	4 8	..	9·5	..	47·6	..	..	..	..	..	..	..	233·3	9·24
..	9·0	..	5·6	0·4	69·8	..	6·8	..	8·1	7·7	..	..	370·7	14·70
..	5·0	..	8·4	..	66·9	..	..	..	1·7	..	..	..	262·5	10·30
..	9·8	..	8·9	..	32·0	..	5·4	..	3·4	4·9	..	..	341·5	15·48
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	285·7	..	..	..	..	..	..	..	714·3	14·29

TABLE

Stations and Districts.	Average annual strength.	Enteric group of fevers.					Dysentery.			
		Typhoid fever.	Para. A.	Para. B.	Para. C.	Enteric group.	Bacillary.	Bacillary exudate.	Protozoal.	Clinical.
Total Lahore District .	12,933	1·1	0·8	..	..	0·4	1·7	2·6	0·9	2·7
Bannu . . .	2,024	0·5	1·0	..	..	0·5	11·4	..	1·0	4·0
D. I. Khan . .	117	..	..	..	..	..	8·5	..	..	..
Kalabagh and Mari Indus	153	13·1	..	..	..	6·5	..	6·5	..	6·5
Manzai . . .	766	2·6	..	..	..	..	9·1	..	..	2·6
Mir Ali . . .	776	..	..	..	..	..	1·3	2·6	1·3	5·2
Razmak . . .	4,657	0·9	0·6	..	..	0·4	4·5	..	..	1·9
Wana	3,198	..	..	..	..	0·3	5·3	1·3	..	1·3
Total Waziristan District .	11,691	0·8	0·4	..	..	0·4	6·0	0·6	0·3	2·4
Chaman	1,585	..	1·3	..	..	..	1·3	0·6	..	..
Quetta	7,015	0·9	0·3	0·1	..	0·4	3·7	2·4	0·6	7·6
Sibi	158	..	....	..	..	..	..	..	..	..
Total Baluchistan District .	8,758	0·7	0·5	0·1	..	0·3	3·2	2·1	0·5	6·1
Fort Sandeman . .	2,111	..	0·5	..	..	..	0·5	1·4	..	0·5
Hindubagh . . .	290	..	..	..	..	..	..	..	..	..
Loralai	641	..	..	..	..	..	3·1	..	..	3·1
Total Zhob Bde. Area .	3,042	..	0·3	..	..	..	1·0	1·0	..	1·0
Hyderabad . . .	126	..	..	..	..	..	7·9	..	..	..
Karachi	1,556	0·6	1·3	..	..	..	8·4	..	0·6	0·6
Total Sind Bde. Area . .	1,682	0·6	1·2	..	..	..	8·3	..	0·6	0·6
Bareilly	1,087	0·9	..	..	..	1·8	14·7	8·8	..	3·7
Dehra Dun . . .	2,734	0·7	0·4	..	..	..	8·8	2·9	0·5	0·7
Jhansi	595	..	1·7	..	..	1·7	15·1	3·4	..	3·4
Landsdowne . . .	1,876	1·1	0·5	..	..	0·5	0·5	6·9	1·1	3·5
Meerut	2,342	0·4	1·7	..	..	0·9	12·0	6·4	0·9	0·9
Nowgong . . .	56	..	..	..	..	..	17·9	..	..	..
Roorkee	2,478	0·8	..	..	..	0·8	2·8	0·4	..	0·8
Total Meerut District . .	11,168	0·7	0·6	..	..	0·7	7·7	4·3	0·7	2·5
Almora	745	..	..	..	..	..	5·4	1·3	..	2·7
Allahabad. . . .	359	..	..	..	..	..	5·6	5·6	5·6	..
Benares	596	3·4	..	..	..	1·7	..	....	..	1·7
Cawnpore . . .	89	..	..	..	..	..	..	..	..	..
Fatehgarh . . .	676	..	..	..	..	..	..	1·5	..	3·0
Fyzabad	80	..	..	..	..	..	..	..	..	..
Gorakhpore . . .	174	..	..	..	..	..	..	..	..	..
Lucknow	1,484	0·7	0·7	..	..	..	13·5	3·4	1·3	5·4
Total Lucknow District .	4,203	0·7	0·2	..	..	0·2	6·2	2·1	1·0	3·1
Calcutta (Allpore) . .	761	..	1·3	..	..	..	13·1	2·6	1·3	..
Dinapore	40	..	..	..	..	..	..	..	..	..
Gyantse	91	..	..	..	..	..	..	..	..	..
Ghoom	73	..	..	..	..	..	..	..	..	..
Shillong	1,541	..	..	..	..	0·6	2·6	5·8	..	3·9
Bankura	355	..	2·8	..	..	..	..	..	..	..
Chittagong.	543	..	....	....	....	....	9·2	1·8	5·5	1·8
Comilla	524	..	..	..	..	..	..	1·9	..	1·9
Dacca	205	..	..	..	..	..	4·9	..	..	..
Mymensingh . . .	396	..	..	..	..	..	..	..	..	..
Midnapore . . .	554	..	..	..	..	..	7·2	..	..	1·8
Saidpur	568	..	..	..	..	1·8	3·5	..	..	3·5

XXIII—*contd.*

Colitis.	Diarrhœa.	Cholera.	Venereal diseases.	Small-pox.	Malaria.	Dengue.	Sand-fly fever.	Plague.	Influenza.	Pneumonia lobar and lobular.	Heat-stroke.	Heat-exhaustion.	All causes.	Average number constantly sick.
0·2	5·5	..	7·4	0·2	101·1	..	7·5	..	7·6	5·3	..	..	371·9	13·98
..	10·9	0·5	10·4	..	155·1	..	50·9	..	3·0	5·9	..	..	841·8	23·87
..	..	..	25 6	..	341·9	..	..	..	..	..	..	..	555·6	18·97
..	13·1	..	6·5	13·1	176·5	..	6·5	..	..	13·1	..	6·5	1,137·3	29·87
1·3	6·5	..	15·7	1·3	113·6	1·3	11·7	..	..	7·8	..	..	347·3	12·08
..	..	..	9·0	..	154·6	..	24·5	..	8·9	..	..	..	341·5	7·01
..	5·2	..	10·5	..	57·8	..	..	..	0·6	5·4	..	..	311·6	14·97
0·3	10·9	..	6·6	..	436·5	..	0·6	..	0·9	5·0	..	..	729·5	20·71
0·2	7·5	0·1	9·8	0·3	192·7	0·1	11·5	..	1·3	5·2	..	0 1	500·6	17·60
..	8·2	..	3·2	..	122·4	..	6·9	..	3·2	6·3	..	..	321·8	9·09
0·1	3·1	..	6·4	0·1	180·8	..	0·1	..	8·0	6·3	..	..	428·5	19·42
..	6·3	...	..	...	506·3	..	..	..	..	6·3	..	...	708·9	16·52
0·1	4·1	..	5·7	0·1	176·1	..	1·4	..	7·0	6·3	..	..	414·2	17·50
..	11·4	..	3·3	..	243·5	..	7·1	..	..	5·7	..	..	465·7	10·46
..	6·9	..	3·4	..	134·5	..	17·2	..	..	3·4	..	..	279·3	4·24
..	1·6	..	4·7	1·6	276·1	..	3·1	..	..	3·1	..	..	435·3	11·31
..	8·9	..	3·9	0·3	240·0	..	7·2	..	..	4·9	..	..	441·5	10·05
..	..	..	..	..	71·4	..	..	..	..	..	..	..	150·8	5·56
0·6	1·3	..	2·6	..	50·8	..	3·2	..	0·6	2·6	..	..	272·5	12·37
0·6	1·2	..	2·4	..	52·3	..	3·0	...	0·6	2·4	..	..	263·4	11·86
..	1·8	..	7·4	..	93·8	..	..	..	..	5·5	..	..	431·5	22·25
..	..	..	16·5	..	105·7	..	1·1	..	1·1	7·7	..	..	478·1	25·31
1·7	6·7	..	6·7	..	247·1	..	..	..	3·4	6·7	6·7	3·4	716·0	27·24
..	9·1	..	25·6	..	187·6	..	..	..	23·5	3·2	..	..	535·2	27·35
..	3·0	..	14·5	1·3	91·4	..	0·4	..	0·9	10·3	..	..	359·0	18·05
..	..	..	17·9	..	160·7	..	..	..	..	..	..	..	410·7	6·07
..	3·6	..	9·3	..	74·0	..	..	..	..	2·0	..	..	261·5	8·06
0·1	3·5	..	14·6	0·3	116·0	..	0·4	..	4·6	5·9	0·4	0·2	422·4	20·01
..	4·0	..	33·6	..	143·6	..	..	..	..	4·0	..	..	445·6	18·07
...	..	..	33·4	..	80·8	..	2·8	..	2·8	5·6	..	..	515·3	22·34
..	1·7	..	11·7	1·7	85·6	1·7	16·8	..	...	1·7	..	..	523·5	21·85
..	...	..	..	11·2	101·1	..	11·2	..	..	11·2	..	..	337·1	11·01
..	4·4	..	4·4	...	187·9	..	5·9	1·5	4·4	8·9	..	..	492·6	16·85
..	..	..	12·5	..	150·0	..	12·5	..	..	..	..	..	400·0	12·50
..	..	..	34·5	..	201·1	..	..	..	..	17·2	..	..	402·3	10·17
2·0	6·7	..	15·5	...	74·1	..	6·7	..	11·5	6·1	..	..	462·9	23·21
0·7	4·0	..	18·3	0·5	114·2	0·2	6·4	0·2	5·0	5·9	..	..	471·3	20·01
25·0	1·3	..	23·7	..	43·4	34·2	..	..	14·5	11·8	..	1·3	404·7	31·50
..	..	..	...	..	50·0	..	..	..	..	..	..	..	225·0	5·75
..	..	..	...	..	54·9	..	..	..	..	..	..	..	175·8	4·51
..	..	..	27·4	..	82·2	..	..	..	..	..	..	..	164·4	14·38
..	1·9	..	6·5	0·6	83·1	..	0·6	..	13·0	5·8	..	..	506·8	19·55
..	14·1	..	14·1	..	42·3	..	..	..	..	..	..	..	245·1	7·83
..	..	..	9·2	..	206 3	..	..	..	57·1	3·7	..	..	609 6	17·42
..	..	..	26·7	..	126·0	..	..	..	...	3·8	..	..	292·0	8·15
..	..	..	19·5	..	68·3	..	..	..	34·1	4·9	..	..	365·9	11·90
..	...	..	10·1	..	48·0	..	..	..	7·6	5·1	..	..	330·8	9·22
3·6	1·8	..	12·6	..	75·8	..	1·8	..	3·6	5·4	..	..	404·3	11·28
..	8·8	..	7·0	..	109·2	..	...	..	14·1	7·0	..	..	331·0	9·60

TABLE

Stations and Districts.	Average annual strength.	Enteric group of fevers.					Dysentery.			
		Typhoid fever.	Para. A.	Para. B.	Para. C.	Enteric group.	Bacillary.	Bacillary exudate.	Protozoal.	Clinical.
Total P. & A. District. . .	5,651	..	0·4	..	..	0·4	4·6	2·3	0·7	1·9
Agra	93	..	..	..	..	..	..	..	..	..
Delhi	2,088	..	..	..	..	0·5	2·4	1·9	..	7·7
Muttra	541	5·5	..	..	..	..	1·8	..	..	..
Total Delhi Bde. Area . .	2,722	1·1	..	..	..	0·4	2·2	1·5	..	5·9
Ahmednagar . . .	976	..	..	..	..	..	..	1·0	..	..
Aurangabad . . .	1,021	..	..	..	..	..	2·9	..	..	..
Jubbulpore . . .	2,183	..	..	..	..	0·5	15·6	8·7	0·5	..
Kamptee	471	..	..	..	..	..	4·2	6·4	..	2·1
Pachmarhi . . .	361	..	5·5	..	..	..	..	8·3	..	..
Saugor	516	..	1·9	..	..	1·9	5·8	7·8	..	..
Trimulgherry (Secunderabad).	3,117	..	0·3	..	..	1·3	15·4	4·2	1·0	0·6
Total Deccan District . .	8,645	..	0·5	..	..	0·7	10·4	5·0	0·5	0·3
Belgaum	1,090	..	..	..	..	..	..	1·8	..	..
Poona	3,816	..	..	..	..	0·9	9·2	3·7	..	0·3
Total Poona Bde. Area . .	4,906	..	..	..	..	0·6	7·1	3·3	..	0·2
Ahmedabad	569	..	..	..	..	..	1·8	3·5	..	3·5
Baroda	478	..	..	..	..	4·2	..	6·3	..	..
Bombay (Colaba). . .	557	..	..	..	..	..	..	3·6	..	1·8
Deolali	212	..	..	..	..	..	..	4·7	..	..
Mhow	868	1·2	..	..	..	1·2	3·5	21·9	..	2·3
Mt. Abu	20	..	..	..	..	..	..	..	..	..
Nasirabad	737	..	..	..	..	..	10·9	..	..	1·4
Neemuch	562	1·8	1·8	..	..	3·6	1·8	5·3	..	1·8
Total Bombay District . .	4,003	0·5	0·2	..	..	1·2	3·2	7·5	..	1·7
Bangalore . . .	2,598	..	0·4	..	..	..	5·8	3·5	0·4	..
Cannanore . . .	585	..	..	..	..	..	5·1	1·7	..	1·7
Madras, St. Thomas Mt.	524	..	..	..	..	1·9	5·7	3·8	..	..
Trichinopoly . .	136	..	..	..	..	..	..	..	..	..
Wellington . . .	53	..	..	..	..	..	18·9	..	..	..
Total Madras District . .	3,896	..	0·3	..	..	0·3	5·6	3·1	0·3	0·3
Mandalay . . .	842	1·2	..	..	..	..	4·8	11·9	2·4	1·2
Maymyo	1,458	..	..	..	..	0·7	3·4	7·5	0·7	4·8
Mingaladon . . .	761	..	..	..	..	..	19·7	..	5·3	2·6
Total Burma District . .	3,061	0·3	..	..	..	0·3	7·8	6·9	2·3	3·3
Total All-India . .	116,984	0·5	0·4	0·0	..	0·5	5·1	3·5	0·4	3·2

XXIII—*concld.*

Colitis.	Diarrhœa.	Cholera.	Venereal diseases.	Small-pox.	Malaria.	Dengue.	Sand-fly fever.	Plague.	Influenza.	Pneumonia, lobar and lobular.	Heat-stroke.	Heat-exhaustion.	All causes.	Average number constantly sick.
0·5	2·7	..	12·9	0·2	89·2	4·6	0·4	..	14·5	5·7	..	0·2	409·7	15·94
10·8	43·0	..	..	..	75·3	..	..	..	..	..	..	..	763·4	25·05
..	6·2	..	14·8	..	135·5	..	..	..	..	7·2	..	..	571·8	17·13
..	12·9	..	3·7	5·5	134·9	..	..	..	..	1·8	..	..	602·6	17·49
0·4	8·8	..	12·1	1·1	133·4	..	..	..	..	5·9	..	..	584·5	17·47
..	2·0	..	8·2	..	42·0	..	..	..	..	2·0	..	..	292·0	8·51
..	2·0	..	1·0	..	61·7	..	..	..	1·0	2·0	..	..	177·3	7·36
..	6·9	..	2·3	0·5	72·4	..	..	..	..	0·9	..	..	357·3	13·90
..	6·4	..	12·7	..	72·2	..	42·5	..	..	4·2	..	..	439·5	13·99
..	..	..	11·1	..	97·0	..	..	..	2·8	2·8	..	..	196·7	4·65
..	..	..	9·7	..	104·6	..	..	..	3·9	5·8	..	..	418·6	12·36
..	1·9	..	6·1	..	18·9	..	..	..	2·2	2·9	..	..	390·8	13·79
..	3·2	..	5·6	0·1	51·4	..	2·3	..	1·3	2·4	..	..	342·2	12·01
1·8	11·9	..	17·4	0·9	37·6	..	..	..	2·8	2·8	..	..	470·6	12·00
..	2·1	0·3	11·8	..	88·6	..	..	..	2·1	5·5	..	0·3	324·4	13·40
0·4	4·3	0·2	13·0	0·2	77·3	..	..	..	2·2	4·9	..	0·2	356·9	13·09
..	..	..	1·8	..	205·6	7·0	3·5	..	5·3	1·8	..	..	423·6	10·25
..	..	..	20·9	..	265·7	..	..	..	4·2	2·1	..	..	439·3	11·17
..	3·6	..	19·7	..	219·0	..	..	..	12·6	7·2	..	..	535·0	28·76
..	..	..	4·7	..	70·8	..	..	..	..	..	..	..	339·6	13·30
..	2·3	..	8·1	..	1·5·2	..	..	..	..	2·3	..	..	308·8	13·51
..	..	..	..	..	150·0	..	..	..	50·0	..	..	..	200·0	4·50
..	6·8	..	1·4	..	164·2	..	..	..	..	2·7	..	..	356·9	16·00
..	3·6	..	..	..	368·3	..	..	..	..	..	..	..	613·9	14·48
..	2·7	..	7·7	..	202·8	1·0	0·5	..	3·2	2·5	..	..	424·9	15·48
..	9·2	..	14·6	..	26·9	0·4	..	..	27·3	3·5	..	..	406·9	19·80
..	3·4	..	17·1	..	22·2	1·7	..	..	..	1·7	..	..	336·8	13·69
..	5·7	..	17·2	..	19·1	398·9	..	..	19·1	1·9	..	..	839·7	21·70
..	7·4	..	..	..	7·4	58·8	..	..	7·4	..	..	..	477·9	16·91
..	..	..	18·9	..	18·9	..	..	..	18·9	..	..	..	169·8	5·28
..	7·7	..	14·9	..	24·4	56·2	..	..	21·3	2·8	..	..	453·8	18·84
..	20·2	..	114·0	..	121·1	90·3	..	..	..	4·8	1·2	2·4	649·6	31·54
..	8·9	..	26·1	..	182·4	2·7	..	..	2·1	2·7	..	..	741·4	28·05
..	1·3	..	32·9	..	74·9	84·1	..	..	..	9·2	..	..	613·7	23·59
..	10·1	..	51·9	..	138·8	47·0	..	..	1·0	4·9	0·3	0·7	684·4	27·90
0·2	5·6	0·0	10·1	0·2	125·9	8·4	7·5	0·0	5·4	4·9	0·0	0·1	422·7	15·71

TABLE XXIV.

BRITISH OFFICERS OF THE INDIAN ARMY.

Table showing the average strength, admissions into hospital, deaths, numbers invalided and average constantly sick, during the year 1935, with ratios per 1,000 of the strength.

Diseases.	Actuals.				Ratio per 1,000.			
Average strength, 2,053.	Admissions.	Deaths.	Invalids, sent home.	Average number constantly sick.	Admissions.	Deaths.	Invalids, sent home.	Constantly sick.
Specific Diseases due to infection or infestation.								
Common Cold	5	...	...	0·05	2·4	...	...	0·02
Diphtheria	4	...	...	0·39	1·9	...	...	0·19
Dysentery	36	...	...	1·32	17·5	...	...	0·64
Enteric fever (inclusive of typhoid, Para. A, B & C and enteric group).	8	...	...	1·04	3·9	...	...	0·51
Erysipelas	...	...	...	...	...	...	...	...
Influenza	13	...	...	0·20	6·3	...	...	0·10
Malaria	82	1	1	1·91	39·9	0·49	0·49	0·93
Measles	1	...	...	0·04	0·5	...	...	0·02
Meningococcal infection (cerebro-spinal fever)	...	...	...	...	...	...	...	...
Mumps	2	...	...	0·04	1·0	...	...	0·02
Pneumonia	7	1	2	0·43	3·4	0·49	0·97	0·21
Pyrexia of uncertain origin	1	...	...	0·03	0·5	...	...	0·01
Rheumatic fever	1	...	...	0·20	0·5	...	...	0·10
Sand-fly fever	20	...	...	0·23	9·7	...	...	0·11
Scarlet fever	...	...	...	...	...	...	...	...
Small-pox	...	...	...	...	...	...	...	...
Tuberculosis — Pulmonary	...	...	...	...	...	...	...	...
Tuberculosis — Other	...	...	...	...	...	...	...	...
Venereal diseases — Gonorrhœa	...	...	...	...	...	...	...	...
Venereal diseases — Soft chancre	3	...	...	0·47	1·5	...	...	0·23
Venereal diseases — Syphilis	...	...	...	...	...	...	...	...
Venereal diseases — Other V.D.	...	...	...	...	...	...	...	...
Other diseases due to infection	...	...	...	...	...	...	...	...
Diseases due to infestation by Metazoan parasites — Scabies	34	3	...	1·29	16·6	1·46	...	0·63
Diseases due to infestation by Metazoan parasites — Other diseases	...	...	...	...	...	...	...	...
	4	...	...	0·06	1·9	...	...	0·03

Other diseases classified under systems.

Diseases of the nervous system	13	1	1	0·53	6·3	0·49	0·49	0·26
Mental diseases	11	...	2	0·67	5·4	...	0·97	0·33
Diseases of the eye	...	...	...	...	...	...	...	...
Diseases of the ear and nose	33	...	...	0·91	16·1	...	...	0·44
Diseases of the circulatory system. — Valvular diseases of the heart	...	...	...	0·01	...	...	...	0·00
Diseases of the circulatory system. — Disordered action of the heart	2	...	...	0·05	1·0	...	...	0·02
Diseases of the circulatory system. — Other diseases	7	2	1	0·32	3·4	0·97	0·49	0·16
Diseases of the blood and blood forming organs	4	1	...	0·28	1·9	0·49	...	0·14
Diseases of ductless or endocrine glands	...	...	...	...	...	...	...	...
Diseases of the breast	...	...	...	...	...	...	...	...
Diseases of the respiratory system. — Larynx and trachea	2	...	...	0·03	1·0	...	...	0·01
Diseases of the respiratory system. — Bronchi & bronchioles	20	...	...	0·41	9·7	..	...	0·20
Diseases of the respiratory system. — Other diseases	1	...	...	0·01	0·5	...	...	0·00
Diseases of the teeth and gums	3	...	...	0·02	1·5	...	...	0·01
Diseases of the digestive system. — Inflammation of the tonsils	32	...	...	0·64	15·6	...	...	0·31
Diseases of the digestive system. — Inflammation of pharynx	8	...	...	0·10	3·9	...	...	0·05
Diseases of the digestive system. — Inflammation of stomach	13	...	...	0·37	6·3	...	...	0·18
Diseases of the digestive system. — Gastric ulcer	1	...	...	0·01	0·5	...	...	0·00
Diseases of the digestive system. — Duodenal ulcer	2	...	1	0·22	1·0	...	0·49	0·11
Diseases of the digestive system. — Liver diseases	9	...	...	0·50	4·4	...	...	0·24
Diseases of the digestive system. — Other diseases	110	1	...	3·65	53·6	0·49	...	1·78
Diseases due to disorders of nutrition or of metabolism	1	...	...	0·04	0·5	...	...	0·02
Diseases of the generative system	5	...	...	0·14	2·4	...	...	0·07
Diseases of bones, joints, muscles, fasciae and bursae	29	...	...	0·92	14·1	...	...	0·45
Diseases of the areolar tissue	54	...	...	1·38	26·3	...	...	0·67
Diseases of the skin	4	...	...	0·25	1·9	...	...	0·12
Diseases of the urinary organs	10	...	...	0·53	4·9	...	...	0·26
Injuries — General	8	...	2	0·22	3·9	...	0·97	0·11
Injuries — Local	103	4	4	4·16	50·2	1·95	1·95	2·03
Injuries — In action	...	...	...	...	...	...	...	...
Tumours and cysts	2	1	...	0·07	1·0	0·49	...	0·03
Poisons	...	...	...	...	...	...	...	...
No appreciable disease	†4	...	...	0·02	1·9	...	...	0·01
Suicides*	...	2	...	...	...	0·97	...	...
Total	712	15	14	24·16	346·8	7·31	6·82	11·77

* The figures against "Suicides" having already been shown under the heading of the injury, etc., which caused death, are not included in the total.

† Includes 2 cases of malformations.

TABLE XXV.

INDIAN OFFICERS AND INDIAN OTHER RANKS.

Table showing admission and death ratios per 1,000 of strength by Commands contrasted with the previous year, and the average for the previous 5 years.

Commands.	Years.	Enteric group of fevers.		Influenza.		Cholera.		Small-pox.		Malaria.		Dysentery.	
		A.	D.	A.	D.	A.	D.	A.	D.	A.	D.	A.	D.
Northern Command	1930-34	2·2	0·19	9·5	0·01	0·1	0·02	0·2	0·02	203·7	0·11	15·2	0·03
	1934	1·7	0·18	12·7	..	..	..	0·1	0·02	192·4	0·09	12·3	0·02
	1935	1·6	0·09	5·4	0·04	0·0	0·02	0·2	0·02	137·0	0·05	11·8	0·04
Western Command	1930-34	2·7	0·14	4·9	..	0·01	..	0·2	..	191·4	0·03	25·6	0·08
	1934	2·6	..	8·0	..	..	..	0·1	..	207·5	..	23·9	0·16
	1935	1·3	0·07	4·6	0·07	..	..	0·1	..	175·0	0·22	9·5	..
Eastern Command	1930-34	2·1	0·17	9·2	0·01	0·05	0·03	0·3	0·01	117·8	0·10	14·6	0·05
	1934	2·1	0·08	10·4	0·04	..	..	0·3	0·04	113·3	0·04	11·6	0·08
	1935	1·5	0·13	6·5	..	..	..	0·4	..	111·3	0·08	12·7	..
Southern Command	1930-34	1·9	0·13	9·2	..	0·01	0·02	0·2	0·02	85·8	0·04	17·0	0·06
	1934	1·9	0·14	8·5	..	..	..	0·4	..	83·4	..	15·5	0·05
	1935	1·1	0·19	5·5	..	0·0	0·05	0·1	0.09	80·7	..	13·0	..
Burma District	1930-34	2·6	0·10	21·4	..	0·05	..	0·2	..	158·4	0·25	11·8	..
	1934	1.9	..	16·5	..	..	..	0·3	..	117·4	..	8·7	..
	1935	0·7	..	1·0	..	..	..	..	..	138·8	0·33	20·3	..
All-India	1930-34	2·2	0·17	9·2	0·01	0·04	0·02	0·2	0·01	162·9	0·09	16·5	0·04
	1934	1·9	0·13	10·5	0·01	0·0	..	0·2	0·02	156.5	0·05	13·9	0·05
	1935	1·4	0·11	5·4	0·03	0·0	0·02	0·2	0·03	125·9	0·08	12·2	0·02

		Pyrexia of uncertain origin.		Pneumonia lobar and lobular.		Venereal diseases.		Dengue.		Sand-fly fever.		Plague.	
		A.	D.	A.	D.	A.	D.	A.	D.	A.	D.	A.	D.
Northern Command	1930-34	0·1	0·01	9·1	1·10	7·8	0·02	0·01	..	21·5	..	..	0·00
	1934	0·1	..	7·4	0·62	7·8	0·04	..	..	14·8	..	..	...
	1935	0·1	..	5·1	0·65	7·4	...	0·0	..	14·3	..	..	..
Western Command	1930-34	0·02	..	7·1	1·01	5·6	0·01	0·08	..	10·8	..	..	..
	1934	0·1	..	4·0	0·31	5·5	..	..	..	4·1	..	..	..
	1935	...	..	5·5	0·82	4·9	..	..	..	2·9	..	..	..
Eastern Command	1930-34	0·2	0·01	6·9	0·63	13·6	..	0·9	..	3·8	..	..	..
	1934	0·1	..	5·6	0·51	12·1	..	0·6	..	1·1	..	..	..
	1935	0·0	..	5·9	0·25	14·6	..	1·1	..	1·4	..	0.0	0·04
Southern Command	1930-34	0·5	0·02	4·9	0·50	13·5	..	3·9	..	2·2	..	0·1	0·09
	1934	0·2	0·05	4·1	0·28	10·5	0·05	3·4	..	2·5	..	..	..
	1935	0·0	..	3·1	0·33	9·4	0·05	10·4	..	1·0	..	..	..
Burma District	1930-34	0·05	..	6·4	0·76	39·3	...	27·4		0·6	..	0·05	..
	1934	..	..	4·5	0·32	35·9	..	65·3	..	..	..	..	..
	1935	0·3	..	4·9	...	51·9	..	47·0	..	..	..	..	..
									..				
All-India	1930-34	0·2	0·01	7·6	0·88	10·7	0·01	1·8	..	12·5	..	0·02	0 02
	1934	0·1	0·01	6·0	0·49	9·6	0·03	2·5	..	8·3	..	..	..
	1935	0·1	...	4·9	0·51	10·1	0·01	3·4	..	7·5	..	0·0	0·01

TABLE XXVI.

DETAIL OF DISEASES.

1935.

Diseases.	European Army of India.										Indian Army.					
	British officers attached to European troops. 2,227.			Men. 52,646.				Women. 4,178.		Children. 6,522.		British officers attached to Indian troops. 2,053.			Men present. 116,984.			
	A.	D.	Invalids.	A.	Constantly sick.	D.	Invalids.	A.	D.	A.	D.	A.	D.	Invalids.	A.	D.	Invalids.	Constantly sick.
Diseases caused by infection or infestation.																		
Anthrax	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Blackwater fever	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	0·01
Chicken-pox	3	..	..	5	0·44	..	..	1	..	23	..	..	..	..	141	..	..	9·28
Common cold	11	..	..	342	5·97	..	..	12	..	13	..	2	..	..	675	..	..	11·01
Cholera	..	..	..	2	0·16	..	..	..	..	1	..	..	..	..	2	2	..	0·02
Cow-pox	..	..	..	6	0·11	..	..	..	..	1	..	..	..	..	1	..	..	0·04
Dengue	10	..	..	262	6·38	..	..	5	..	19	..	8	..	..	395	..	..	8·51
Diphtheria	2	..	1	66	5·09	..	..	3	..	24	3	4	..	..	3	..	..	0·19
Dysentery																		
(*a*) Protozoal	8	..	..	158	12·05	..	2	6	..	10	..	8	..	..	50	..	..	3·72
(*b*) Bacillary	27	1	..	637	26·46	1	..	31	..	101	5	17	..	..	592	1	1	20·90
(*c*) Bacillary exudate	16	..	1	353	13·79	..	2	14	..	58	..	5	..	..	407	..	..	14·55
(*d*) Clinical	13	..	..	388	14·86	..	..	9	..	23	..	6	..	..	375	1	..	13·38
Encephalitis (Lethargica)	..	..	..	1	0·11	..	..	..	..	1	..	..	..	..	..	..	..	..
Enteric Fevers—																		
(*a*) Typhoid fever	3	1	3	27	3·72	8	..	..	..	6	..	5	..	..	56	8	..	9·14
(*b*) Paratyphoid A.	..	..	..	13	2·22	..	..	2	..	1	..	2	..	..	46	3	..	6·30
(*c*) Paratyphoid B.	..	..	..	..	..	..	..	1	..	..	..	..	..	..	2	..	..	0·10
(*d*) Paratyphoid C.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
(*e*) Enteric Group	10	..	2	66	8·44	1	1	1	..	5	..	1	..	..	62	2	1	9·74
Enteritis infective. (Including food poisoning)	..	..	..	11	0·32	..	..	..	..	1	..	..	..	..	..	1	..	0·09
Erysipelas	..	..	..	8	0·38	..	..	3	..	1	1	..	..	..	10	..	..	0·45
Gangrene, acute infective	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	0·81
Hydrophobia (Rabies)	..	..	..	1	0·00	1	..	..	..	..	..	..	..	..	..	..	..	..
Influenza	30	..	..	560	15·83	..	..	5	..	17	..	13	..	..	635	3	..	15·62
Jaundice epidemic catarrhal	74	..	..	342	18·77	..	..	4	..	31	..	16	..	..	218	..	..	12·15
Jaundice spirochætal	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..

Leishmaniasis:—																								
(*a*) Kala-azar	..	..	..	3	0·59	..	..	..	..	..	..	..	..	..	—	19	2	4	2·85
(*b*) Oriental sore	3	..	..	7	0·36	..	..	..	..	..	..	..	..	..	..	67	..	..	4·13
Leprosy	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	10	..	13	1·83
Malaria	79	..	1	2,955	107·66	4	..	99	..	103	..	82	1	1	14,728	9	3	358·81
Measles	1	..	..	19	1·08	..	..	2	..	56	..	1	..	..	260	..	..	12·41
Meningococcal infection (Cerebro-spinal fever)	1	..	1	1	0·09	..	..	..	..	28	..	..	..	..	19	7	..	1·88
Mumps	4	..	..	24	1·08	..	..	1	..	..	..	2	..	..	799	..	..	39·91
Plague	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	0·03
Pyæmia	..	..	..	1	0·07	1	..	..	..	1	..	1	..	..	3	..	..	0·90
Pyrexia of Uncertain Origin	1	..	..	37	2·72	..	..	..	..	..	..	..	..	..	11	..	..	1·60
Relapsing fever	..	..	..	..	..	..	..	..	..	..	..	..	..	..	6	..	..	0·28
Rheumatic fever	2	..	..	68	7·26	1	4	6	..	11	1	1	..	..	96	..	3	7·77
Rubella (German measles)	3	..	..	23	0·74	..	..	7	..	33	..	1	..	..	6	..	..	0·23
Sand-fly fever	60	..	..	1,922	39·53	..	..	15	..	26	..	20			882		..	14·60
Scarlet fever	1	..	..	3	0·32	..	..	2	..	27	..	..	..	..	1	..	..	0·10
Septicæmia	1	..	..	7	0·67	2	2	..	..	1	1	3	2	..	8	5	..	0·80
Small-pox	..	..	..	3	0·43	..	..	3	1	2	..	..	..	..	22	3	..	1·93
Tetanus	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	0·09
Tuberculosis Pulmonary	1	..	..	54	19·84	3	35	3	..	..	..	..	..	..	219	15	194	24·75
Tuberculosis Other cases	..	..	..	15	4·50	..	9	3	..	3	..	..	..	..	56	8	25	6·41
Typhus fever	2	..	..	19	2·01	..	..	1	..	..	..	..	..	..	45	1	..	4·43
Undulent fever	..	..	..	1	0·13	..	..	..	..	..	..	3	..	..	4	..	1	0·72
Venereal diseases—																		
(*a*) Gonorrhœa	1	..	..	1,357	175·57	..	1	..	..	8	..	3	..	..	543	1	4	58·27
(*b*) Soft chancre	..	..	..	357	36·33	..	..	..	..	..	..	..	..	..	210	..	..	22·57
(*c*) Syphilis	..	..	..	315	27·34	1	1	1	..	..	..	..	..	..	33	..	3	38·00
(*d*) Other cases	..	..	..	13	0·96	..	..	..	..	..	..	..	..	..	..	..	..	..
Whooping-cough	..	..	..	..	..	..	..	..	—	10	..	..	..	..	..	..	..	..
Other diseases caused by infection	..	..	..	1	0·13	..	..	3	..	5	..	2	1	..	23	..	2	1·81
Diseases due to infestation by Metazoan Parasites.																		
Ankylostomiasis	2	..	..	6	0·83	..	..	..	..	1	..	..	..	..	846	..	1	29·97
Ascariasis	..	..	..	6	0·08	..	..	..	..	4	..	..	..	..	126	..	..	4·76
Bilharziasis	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Dracontiasis (Guinea-worm)	..	..	..	9	0·41	..	..	..	..	..	..	..	..	..	202	..	3	16·96
Intestinal tæniasis—	..	..	..	15	0 35	..	..	..	..	..	..	..	..	..	5	..	..	0·22
(*a*) Tænia Solium	2	..	..	24	0·67	..	..	10	..	1	..	1	..	..	36	..	..	1·06
(*b*) Tænia Saginata	..	..	..	107	2·06	..	..	..	..	38	..	3	..	..	48	..	..	1·52
Other Intestinal parasites	..	..	..	5	0·50	..	5	..	..	1	..	..	..	..	..	..	..	..
Pediculosis	..	..	..	10	0·16	..	..	..	..	3	..	..	..	..	1	..	..	0·02
Scabies	..	..	..	75	2·06	..	..	..	..	..	..	..	..	..	1,126	..	..	33·78
Other diseases due to infestation	1	..	..	11	0·31	..	..	..	..	9	..	..	..	—	68	..	..	3·40

A.—Admissions. D.—Deaths. *Includes one death from hæmorrhage encephalitis.

TABLE XXVI—*contd.*

Diseases.	European Army of India.												Indian Army.					
	British officers attached to European troops. 2,227			Men. 52,646				Women. 4,178		Children. 6,522		British officers attached to Indian troops. 2,053			Men present. 116,984			
	A.	D.	Invalids.	A.	Constantly sick.	D.	Invalids.	A.	D.	A.	D.	A.	D.	Invalids.	A.	D.	Invalids.	Constantly sick.
Diseases of the nervous system.																		
Aphasia	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	0·19
Cerebral hæmorrhage	...	...	...	2	0·43	1	1	...	...	1	...	...	...	...	...	...	...	...
Chorea	...	...	...	3	0·24	...	...	...	...	1	...	...	...	...	...	...	...	...
Convulsion	...	...	...	6	0·45	...	1	1	...	8	4	...	...	...	1	...	...	0·06
Diseases of the spinal cord	...	...	...	8	1·98	2	4	...	...	...	...	...	...	...	8	1	3	0·61
Epilepsy	2	...	1	26	3·37	...	13	7	...	1	...	...	...	1	37	...	21	2·56
Vertigo	...	...	...	23	0·77	...	...	1	...	...	...	1	...	...	24	...	...	0 62
Meningitis	...	...	...	...	...	...	...	...	...	4	2	...	...	...	8	4	...	0·99
Headache	...	...	...	199	5·07	...	...	8	...	2	...	3	...	...	14	...	...	0·35
Neuralgia	1	...	...	23	0·80	...	...	1	...	...	...	...	...	...	22	...	...	0·69
Neuritis	...	...	...	25	2·29	...	1	...	...	1	...	2	...	...	32	...	1	1·45
Paralysis	...	...	...	13	1·35	...	...	...	...	1	...	1	...	...	43	...	4	4·26
Sciatica	4	...	1	33	3·28	...	...	...	...	...	...	2	...	...	126	...	4	6·60
Other diseases of the nervous system	11	...	1	43	3·60	1	7	2	...	9	1	2	1	...	52	2	6	2·04
Mental diseases.																		
Feeblemindedness	...	...	...	7	3·69	..	3	2	...	...	...	...	...	...	1	...	...	0·02
Hysteria	1	...	1	63	7·10	...	9	12	...	...	...	...	...	...	38	...	7	2·42
Involution (Melancholia)	...	...	...	7	2·25	...	1	...	...	...	...	...	...	...	...	...	...	...
Mania	...	...	...	...	0·19	...	...	...	...	...	...	...	...	...	8	...	7	1·01
Mental deficiency	...	...	...	2	0·34	...	...	...	...	...	...	...	...	...	...	...	2	...
Neurasthenia	2	...	1	24	1·38	...	3	9	...	...	...	6	...	1	18	...	1	1·31
Schizophrenia (Dementia præcox)	...	...	...	23	11·42	...	20	...	...	...	...	1	...	1	3	...	2	0·47
Other mental diseases	3	...	1	47	10·36	...	17	3	...	1	...	4	...	...	25	...	11	1·56
Diseases of the eye.																		
Amblyopia and amaurosis	...	...	...	3	0·14	...	...	...	...	...	...	...	...	...	4	..	3	0·36
Anomalies of refraction	...	...	...	10	0·27	...	6	...	...	2	...	..	...	...	9	...	7	0·29
Blephritis	...	...	...	8	0·51	...	1	...	...	...	...	...	...	...	8	...	...	0·25
Conjunctivitis	...	...	...	86	3·05	...	...	1	...	10	...	...	...	...	752	...	...	21·71
Conjunctivitis granular (Trachoma)	...	...	...	3	0·14	...	...	...	...	...	...	...	...	...	237	...	8	12·95
Cataract	...	...	...	3	0·32	...	3	...	...	...	...	...	...	...	11	...	3	0·63
Glaucoma	...	...	...	1	0·17	...	...	...	...	...	...	...	...	...	2	...	...	0·11

Iritis	...	...	...	8	0·57	...	...	1	...	...	...	...	...	...	12	...	...	0·94
Keratitis	1	...	...	37	2·60	...	1	...	...	1	...	...	...	...	166	...	5	10·37
Retinitis	...	...	...	3	0·22	...	...	...	...	...	...	...	...	...	1	...	1	0·10
Other diseases of the eye	5	...	...	28	2·52	...	3	5	...	3	...	...	...	...	155	...	11	6·95
Diseases of the ear.																			
Inflammation of the external ear	1	...	...	251	6·03	...	...	3	...	5	...	4	...	...	111	...	...	2·93
Diseases of the middle ear	3	...	...	180	7·57	...	14	3	...	20	...	2	...	...	322	1	18	16·53
Furunculosis	...	...	...	221	5·88	...	...	5	...	5	...	4	...	...	57	...	...	2·02
Diseases of the mastoid process	...	...	...	35	2·95	...	...	3	...	6	...	1	...	...	20	...	1	2·58
Other diseases of the ear	10	...	...	2	0·09	...	...	...	...	...	...	...	...	...	12	...	...	0·35
Diseases of the nose.																			
Diseases of the Mucous membrane	11	...	...	260	5·72	...	...	5	...	19	...	6	...	...	625	...	...	11·23
Diseases of the bone and cartilage	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Sinusitis	...	...	...	118	7·01	1	1	4	...	1	...	9	...	...	34	...	...	1·18
Other diseases of the nose	13	1	...	80	3·05	...	...	4	...	...	...	7	...	...	8	...	...	0·25
Diseases of the circulatory system.																			
Diseases of the Valves	...	...	1	24	3·26	2	10	2	1	1	...	...	...	...	14	1	13	1·66
Disordered Action of the Heart	2	...	...	125	6·87	1	11	7	1	3	1	2	...	...	41	4	6	1·66
Diseases of Blood vessels	5	...	3	76	5·99	...	5	14	...	...	...	6	...	1	33	3	4	1·91
Endocarditis	1	...	1	5	0·64	1	...	...	...	5	1	...	...	...	5	...	2	0·80
Myocarditis	...	...	1	...	...	...	...	3	...	1	...	...	...	...	4	2	1	0·18
Pericarditis	...	...	...	2	0·14	...	1	...	...	...	...	...	...	...	1	...	1	0·23
Other diseases of the Circulatory system	...	...	...	2	0·02	1	...	...	1	...	...	1	2	...	4	3	...	0·11
Diseases of the Blood and blood forming organs.																			
Anæmia primary	...	...	...	11	0·44	...	...	9	...	2	...	...	...	...	15	1	...	0·66
Anæmia pernicious	...	...	...	2	0·47	1	1	1	...	...	...	...	...	...	15	1	1	1·13
Anæmia secondary	2	...	...	17	0·81	...	...	5	...	...	...	...	...	...	140	...	4	8·31
Diseases of the splee	...	...	...	6	0·54	...	1	...	...	...	...	...	...	...	27	1	1	1·66
Lymphadenitis	10	...	...	223	12·83	...	...	1	...	18	...	2	...	...	165	...	8	12·22
Lymphangitis	...	...	...	9	0·73	...	...	1	...	...	...	...	...	...	1	...	...	0·02
Other blood diseases	1	...	...	5	0·64	...	1	1	1	1	...	2	1	...	4	1	2	0·28

TABLE XXVI—*contd.*

Diseases.	European Army of India.										Indian Army.					
	British officers attached to European troops. 2,227			Men. 52,646				Women. 4,178		Children. 6,552		British officers attached to Indian troops. 2,053			Men present. 116,984			
	A.	D.	Invalids.	A.	Constantly sick.	D.	Invalids.	A.	D.	A.	D.	A.	D.	Invalids.	A.	D.	Invalids.	Constantly sick.
Diseases of Glands of internal Secretion.																		
Goitre	...	...	...	12	0·97	...	...	...	...	...	...	...	...	...	19	...	1	0·75
Hyperthyroidism	...	...	...	5	1·00	...	5	2	...	...	...	...	...	...	1	...	...	0·11
Other diseases	...	...	...	5	0·33	...	1	3	1	...	...	...	...	...	2	...	...	0·21
Diseases of the Breast.																		
Mastitis	...	...	...	11	0·25	...	...	15	...	...	...	...	...	...	6	...	...	0·28
Other diseases	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Diseases of the Respiratory System.																		
Asthma	...	...	...	52	3·84	...	5	10	...	9	...	1	...	...	76	...	7	3·46
Bronchitis	10	...	...	757	26·04	...	1	31	...	148	...	19	...	...	1,320	...	3	44·42
Empyema	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Laryngitis	1	...	...	38	1·17	...	1	3	...	6	...	1	...	...	106	...	...	3·14
Pleurisy	2	...	1	93	7·04	...	6	10	...	4	3	1	...	...	221	1	21	21·70
Pneumonia:—																		
(*a*) Lobar	4	...	...	164	15·62	19	...	4	1	6	1	5	1	1	472	47	...	38·33
(*b*) Lobular (Broncho-pneumonia)	1	...	1	58	5·69	2	1	1	...	18	2	2	...	1	104	13	...	7·49
Other diseases	3	...	...	55	3·49	1	6	2	...	...	...	1	...	...	23	1	2	1·72
Diseases of the Teeth and Gums.																		
Caries of the enamel, dentine and cementum.	3	...	...	32	1·01	...	...	16	...	35	...	1	...	...	73	...	...	1·43
Gingivitis	...	...	...	25	0·55	...	...	1	...	6	...	...	...	...	128	...	...	3·14
Pyorrhoea alveolaris	1	...	...	66	1·75	...	...	...	...	2	...	2	...	...	80	...	1	2·56
Other diseases	1	...	...	25	0·52	...	...	...	...	1	...	...	...	...	57	...	...	1·78

Diseases of the Digestive System.																			
Appendicitis	14	...	1	423	29·08	3	2	41	...	12	...	25	1	...	189	3	3	10·85
Cholecystitis and cholangitis	3	...	1	36	3·24	...	...	12	...	1	...	6	...	...	31	...	1	2·01
Colic	7	...	...	160	3·77	...	...	9	...	4	...	4	...	...	136	...	...	2·86
Colitis	4	...	...	19	0·94	...	...	4	1	5	...	3	...	...	21	...	...	0·86
Constipation	8	...	...	332	7·24	...	...	40	...	57	...	3	...	...	377	...	...	6·47
Diarrhœa	44	...	...	784	18·18	...	...	44	...	136	...	25	...	...	651	...	...	14·13
Enteritis	9	...	1	61	1·75	1	...	1	...	66	16	4	...	...	14	...	...	0·39
Fistula in ano	...	...	...	8	1·64	...	...	1	...	...	...	...	...	...	49	...	...	4·15
Gastritis	16	...	...	307	12·87	...	1	33	...	7	...	13	...	...	101	1	1	2·96
Glossitis	...	...	...	4	0·18	...	...	...	...	...	...	...	...	...	5	...	...	0·16
Haemorrhoids (Piles)	8	...	...	195	7·78	...	...	5	...	...	...	5	...	...	177	...	2	9·39
Hepatitis acute	6	...	...	52	3·99	...	1	3	...	5	...	4	...	...	54	...	2	3·04
Hepatic abscess (Tropical abscess)	...	...	...	4	0·57	1	1	...	...	...	...	...	...	...	6	...	...	0·67
Hepatitis chronic (Cirrhosis)	1	...	...	...	0·10	...	...	1	...	...	...	...	...	...	...	...	...	...
Hernia	4	...	...	131	10·14	...	...	6	...	11	...	6	...	...	111	1	6	9·08
Hypertrophy of the tonsils	3	...	...	104	2·68	...	...	12	...	169	...	7	...	...	9	...	...	0·41
Indigestion	10	...	...	152	5·66	...	...	13	...	10	...	13	...	...	428	...	1	10·61
Intestinal obstruction	1	1	1	4	0·25	1	...	...	...	...	...	...	...	...	4	1	...	0·09
Inflammation of the palate and pillars of the fauces	...	...	...	1	0·02	...	...	...	...	...	...	...	...	...	4	...	...	0·07
Jaundice	3	...	...	11	0·63	...	...	1	...	1	...	5	...	...	77	...	...	3·98
Pharyngitis	19	...	...	420	9·20	...	...	8	...	24	...	8	...	...	1,926	...	...	37·97
Peritonitis	...	...	...	11	0·98	2	1	6	...	...	...	...	...	...	1	...	...	0·11
Quinsy	...	...	...	131	3·79	...	...	5	...	1	...	1	...	...	41	...	...	1·21
Sprue	2	...	3	8	2·13	...	3	1	...	...	...	...	...	...	11	...	3	1·99
Stomatitis	...	...	...	5	0·18	...	...	1	...	7	...	...	...	...	18	...	...	0·51
Tonsillitis	51	...	...	1,494	37·45	...	...	56	...	188	...	32	...	...	609	...	8	15·17
Other diseases	27	...	6	207	16·56	4	13	25	...	29	1	11	...	1	167	7	4	9·55
Diseases due to disorders of Nutrition or of Metabolism.																			
Beri-beri	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	...	...	0·19
Diabetes mellitus	...	...	...	4	0·41	3	1	2	...	2	...	...	...	...	5	...	4	1·10
Gout	...	...	...	3	0·12	...	...	...	...	...	...	1	...	...	2	...	...	0·11
Inanition	1	...	1	5	0·13	...	...	3	...	28	8	...	...	...	6	...	...	0·19
Rickets	...	...	...	...	...	...	...	...	...	2	1	...	...	...	...	...	...	...
Scurvy	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	0·09
Other diseases	...	...	...	2	0·09	1	...	2	...	10	...	...	...	...	2	...	1	0·15
Diseas s of the Male Organs of Generation.																			
Balanitis	...	...	...	122	3·64	...	...	...	...	...	...	1	...	...	14	...	...	0·48
Epididymitis	...	...	...	52	2·40	...	...	...	...	...	...	...	...	...	25	...	1	1·20
Hydrocele of tunica vaginalis	1	...	...	28	1·54	...	...	...	...	...	...	...	...	...	17	...	...	0·99
Hypertrophy of the prostate	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	0·22
Orchitis	...	...	...	61	2·43	...	...	...	...	...	...	...	...	...	66	...	...	2·61
Paraphimosis	...	...	...	12	0·57	...	...	...	...	1	...	...	...	...	8	...	...	0·38

TABLE XXVI—*contd.*

Diseases.	European Army of India.										Indian Army.					
	British officers attached to European troops. 2,227			Men. 52,646				Women. 4,178		Children. 6,522		British officers attached to Indian troops. 2,053			Men present, 116,984			
	A.	D.	Invalids.	A.	Constantly sick.	D.	Invalids.	A.	D.	A.	D.	A.	D.	Invalids.	A.	D.	Invalids.	Constantly sick.
Diseases of the Male Organs of Generation—contd.																		
Phimosis	...	...	...	80	3·97	...	...	...	...	23	...	...	...	...	36	...	...	1·71
Prostatitis	...	...	...	8	0·49	...	...	...	...	...	...	2	...	...	...	...	...	...
Stricture of the urethra	...	...	...	1	0·07	...	...	...	...	...	...	...	...	...	3	...	...	0·59
Urethral fistula	...	...	...	1	0·05	...	...	...	...	...	...	...	...	...	...	...	...	...
Urethritis	...	...	...	210	12·87	...	...	...	...	...	...	1	...	...	103	...	...	3·57
Varicocele	...	...	...	59	3·72	...	...	...	...	...	...	1	...	...	12	...	1	0·38
Other diseases	1	...	...	21	1·16	...	...	...	...	...	...	...	...	...	22	...	...	1·11
Diseases of the Female Organs of Generation.																		
Abortion	...	...	...	...	...	...	...	114	...	2	...	...	...	...	...	...	...	...
Affection connected with pregnancy and Parturition and consequent on parturition	...	...	...	...	...	...	...	39	3	...	...	...	...	...	...	...	...	...
Diseases of the ovary	...	...	...	...	...	...	...	6	...	...	...	...	...	...	...	...	...	...
Diseases of the fallopian tube	...	...	...	...	...	...	...	7	1	...	...	...	...	...	...	...	...	...
Displacements and distortions of the uterus	...	...	...	...	...	...	...	8	...	...	...	...	...	...	...	...	...	...
Dysmenorrhœa	...	...	...	...	...	...	...	5	...	...	...	...	...	...	...	...	...	...
Endometritis	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Haemorrhage connected with parturition	...	...	...	...	...	...	...	3	...	...	...	...	...	...	...	...	...	...
Inflammation of vagina	...	...	...	...	...	...	...	2	...	5	...	...	...	...	...	...	...	...
Menorrhaegia	...	...	...	...	...	...	...	21	...	1	...	...	...	...	...	...	...	...
Metrorrhaegia	...	...	...	...	...	...	...	16	...	...	...	...	...	...	...	...	...	...
Pelvic peritonitis	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...
Other diseases peculiar to women	...	...	...	...	...	...	...	57	...	...	...	...	...	...	...	...	...	...

Diseases affecting Child—																								
Asphyxia of child	...	...	...	...	...	...	...	...	...	...	2	2	...	...	...	...	...	...	...	...	...	...	...	...
Injury to child	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Premature birth	...	...	...	...	...	...	...	...	...	...	4	4	...	...	...	...	...	...	...	...	...	...	...	...
Still-birth	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Diseases of Bones, Joints, Muscles, Fascia and Bursæ.																								
Arthritis	2	...	1	51	5·40	...	6	2	...	1	...	1	...	...	58	1	6	4·65						
Diseases of the spine	...	...	...	6	0·76	1	3	...	...	...	...	...	...	...	4	...	3	0·85						
Flat foot	...	...	...	6	0·26	...	10	1	...	...	...	2	...	...	3	...	1	0·12						
Hammertoe	...	...	...	25	1·56	...	...	...	...	...	...	...	...	...	...	...	...	...						
Myalgia	3	...	....	149	4·08	...	...	18	...	2	...	4	...	...	292	...	...	5·78						
Osteo-myelitis	...	...	...	9	1·42	...	3	1	...	1	...	...	...	...	12	...	2	2·14						
Periostitis	...	...	...	24	1·10	...	...	1	...	1	...	...	...	...	19	...	1	1·11						
Synovitis	10	...	...	578	24·53	...	...	...	...	1	...	4	...	...	361	...	5	18·31						
Other deformities of limbs	...	...	...	16	1·39	...	3	1	...	5	...	...	...	...	3	...	3	0·11						
Other diseases	17	...	1	391	27·28	...	18	6	...	2	...	18	...	...	315	...	13	16·40						
Diseases of the areolar tissue.																								
Boil	7	...	...	473	13·29	...	...	3	...	8	...	6	...	...	692	...	...	19·63						
Carbuncle	3	...	...	22	0·60	...	...	...	...	...	...	2	...	...	23	...	...	1·10						
Cellulitis	65	...	...	2,094	70·73	...	...	33	1	68	...	41	...	...	2,701	...	...	92·69						
Cellulitis suppurative (abscess).	...	...	...	207	8·26	...	...	5	...	9	...	5	...	...	411	1	3	15·28						
Other diseases	...	...	...	13	0·48	...	...	1	...	2	...	...	...	...	18	...	1	0·51						
Diseases of the Skin.																								
Acne	...	...	...	13	0·51	...	...	...	...	...	...	...	...	...	15	...	...	0·51						
Dermatitis	7	...	1	229	12·61	...	2	...	...	3	...	2	...	...	331	...	1	13·70						
Eczema	...	...	...	96	5·26	...	...	1	...	1	...	...	...	...	237	...	1	11·85						
Favus	...	...	...	...	...	...	...	...	...	...	...	...	...	...	4	...	...	0·24						
Herpes Zoster	...	...	...	35	1·08	...	1	...	...	...	...	1	...	...	111	...	...	3·24						
Impetigo	4	...	...	374	16·62	...	...	1	...	19	...	...	...	...	96	...	...	4·21						
Ingrowing toe nail	2	...	...	117	3·99	...	...	...	...	2	...	...	...	...	2	...	...	0·05						
Onychia	...	...	...	10	0·28	...	...	...	...	...	...	...	...	...	3	...	...	0·13						
Prickly heat	1	...	...	17	0·38	...	...	...	...	...	...	...	...	...	8	...	...	0·20						
Psoriasis	...	...	...	35	1·39	...	...	...	...	...	...	...	...	...	26	...	...	1·74						
Sycosis (Folliculitis)	...	...	...	28	3·13	...	...	...	...	...	...	...	...	...	18	...	...	2·04						
Tinea	1	...	...	378	11·74	...	1	2	...	1	...	...	...	...	304	...	...	9·52						
Urticaria	...	...	...	31	0·64	...	1	4	...	4	...	1	...	...	98	...	...	2·43						
Wart	...	...	...	40	2·36	...	...	...	...	...	...	...	...	...	9	...	...	0·53						
Whitlow	...	...	...	64	2·40	...	...	...	...	...	...	...	...	...	102	...	...	4·17						
Other diseases	2	...	...	104	5·24	...	1	1	...	5	...	...	...	...	74	1	1	4·78						

TABLE XXVI—*concld.*

Diseases.	European Army of India.										Indian Army.					
	British Officers attached to European troops. 2,227			Men. 52,646			Women. 4,178		Children. 6,522		British Officers attached to Indian troops. 2,053			Men present. 116,984			
	A.	D.	Invalids.	A.	Constantly sick.	D.	Invalids.	A.	D.	A.	D.	A.	D.	Invalids.	A.	D.	Invalids.	Constantly sick.
Diseases of the Urinary Organs.																		
Calculus—																		
(*a*) Bladder	...	...	...	...	...	...	...	...	...	...	...	1	...	...	8	...	1	0·42
(*b*) Kidney	...	...	...	14	1·22	...	2	1	...	...	...	1	...	...	4	...	1	0·68
(*c*) Ureter	5	...	1	10	0·82	...	1	...	...	...	...	1	...	...	7	...	...	0·70
Cystitis	3	...	...	53	3·27	...	...	13	...	4	...	1	...	...	35	...	1	2·11
Haematuria	1	...	...	43	2·23	...	...	2	...	4	...	1	...	...	5	...	...	0·22
Incontinence of urine	...	...	...	6	0·26	...	2	...	...	...	...	...	...	...	3	...	...	0·09
Nephritis acute	...	...	...	11	1·44	4	4	2	1	6	...	4	...	...	21	1	6	2·67
Nephritis chronic	2	1	2	1	0·21	...	...	...	...	...	...	...	...	...	...	...	...	0·10
Renal colic	3	...	...	36	1·62	...	...	2	...	...	...	1	...	...	108	...	...	3·15
Other diseases	6	...	...	111	10·37	...	8	37	...	17	...	...	...	...	91	...	...	4·83
General Injuries.																		
Burns and scalds	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Effects of anti-rabic treatment.	...	...	...	2	0·61	...	...	...	...	...	...	...	...	...	2	...	...	0·05
Effects of inoculation	...	...	...	23	0·31	...	...	...	...	...	...	1	...	...	2	...	...	0·04
Heat exhaustion	3	2	...	78	2·27	4	2	...	...	2	1	2	...	2	13	...	...	0·22
Heat stroke	...	...	...	11	0·56	4	...	...	...	...	...	...	...	...	5	1	...	0·13
Sun stroke	...	...	...	1	0·08	...	...	...	...	...	...	...	...	...	...	...	...	...
Other injuries	3	2	3	22	0·54	11	1	...	...	1	...	5	...	...	19	24	...	0·76
Local Injuries.																		
Abrasions	6	...	...	183	5·32	...	...	1	...	6	...	4	...	...	237	...	...	7·06
Burns and scalds	...	...	...	58	2·47	...	...	...	...	9	...	...	...	...	191	...	...	9·14
Concussions	22	1	...	111	5·00	2	...	1	...	1	...	13	...	...	41	3	1	2·31

Contusions	28	...	...	677	20·04	...	...	8	...	10	...	21	...	1	1,926	3	6	60·92
Dislocations and displacements.	8	...	...	182	11·45	...	6	1	...	...	...	5	...	...	97	...	5	6·10
Fractures	43	2	3	710	49·69	9	9	14	...	37	1	35	2	2	1,212	9	68	115·01
Sprains and strains	19	...	...	947	29·58	...	5	3	...	2	...	12	...	...	805	1	2	25·43
Wounds gun-shot	2	1	1	30	2·84	6	1	...	...	1	...	...	2	...	35	9	2	2·65
Wounds others	24	2	1	303	10·49	1	4	3	...	23	...	10	...	...	1,587	2	8	59·56
Injuries self inflicted	...	...	...	3	0·13	9	...	...	1	...	...	...	...	...	...	10	...	...
Other injuries	9	...	1	71	3·73	6	5	...	...	2	...	5	...	1	93	3	9	5·18
Tumours and Cysts.																		
Carcinoma	...	...	...	3	0·27	2	2	4	...	...	...	1	1	...	2	1	...	0·25
Cysts	...	...	...	68	2·08	...	1	4	...	3	...	...	...	...	94	...	...	3·08
Sarcoma	...	...	...	7	1·37	2	5	...	...	...	...	...	...	...	2	...	1	0·89
New growths malignant (other cases).	...	...	...	2	0·40	...	1	5	...	...	...	...	...	...	14	...	...	1·28
New growths non-malignant	3	...	1	52	3·33	...	1	5	...	1	...	1	...	...	47	1	2	2·48
Malformations	...	...	...	11	0·61	...	4	...	...	5	3	2	...	...	4	...	2	0·44
Poisons.																		
Alcohol	1	...	...	1	0·01	...	...	...	...	...	...	...	...	...	...	...	...	...
Arsenic	...	...	...	1	0·04	...	...	...		...	...	...	...	...	...	...	...	...
Chloroform	...	...	...	1	0·01	...	...	...	...	...	...	...	...	...	...	...	...	...
Other chemical poisons	...	...	...	1	0·04	1	...	2	...	...	...	...	...	...	3	2	...	0·10
Opium	...	...	...	...	...	...	...	...	...	...	...	...	...	...	4	1	...	0·04
Venom of insects	1	...	...	6	0·14	...	...	...	...	...	...	...	...	...	7	...	...	0·15
Venom of Ophidia (Snake bite).	...	...	...	...	...	...	...	...	...	...	...	...	...	...	13	1	...	0·48
Other poisons	...	...	...	1	0·03	...	...	...	...	2	...	...	...	...	3	1	...	0·03
No appreciable diseases	5	...	...	129	4·57	...	...	27	...	21	...	2	...	...	50	...	1	1·56
All other causes	1	...	...	20	1·12	...	...	...	...	1	...	...	...	...	1	2	...	0·11
Total	1,048	15	54	29,858	1,407·76	134	363	1,305	15	2,180	63	712	15	14	49,452	252	648	1,837·30

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ANNUAL REPORT

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WITH THE GOVERNMENT OF INDIA

FOR 1936.

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Annual Report of the Public Health Commissioner with the Government of India for 1936.

VOLUME I.

SECTION I.

ON THE STATE OF THE PUBLIC HEALTH IN BRITISH INDIA AND SOME INDIAN STATES DURING 1936.

Introduction.

1. The principal vital statistical figures for British India are once more presented in the opening paragraph of this report, as it is considered that these give a bird's eye view of conditions which may not be easily obtained elsewhere. The figures for 1935 are given alongside for comparison :—

	1936.	1935.
Mid-year estimated population	281,866,639	278,199,545
Density per square mile	321	312
Births { Number	9,981,143	9,698,794
Births { Rate p. m.	35	35
Death { Number	6,375,731	6,578,711
Death { Rate p. m.	23	24
Infantile death rate per 1,000 live-births	162	164
Vital Index	156	147

Since 1931, when the last census was taken, the country has remained comparatively free from violent outbreaks of epidemic diseases and, during the same period, the annual balance of births over deaths has been consistently favourable to progressive increase of the population. During 1936 the number of births was 282,349 higher than that for 1935 ; on the other hand, the number of deaths was less by 202,980, so that the estimated population for 1936 shows an increase of about 3,600,000 as compared with that of the previous year. As regards the three important infectious diseases, the combined mortality from smallpox, plague and cholera decreased by 62,410. Deaths from cholera which unfortunately had steadily increased during the previous three years, showed a welcome fall amounting to as much as 57,442 which is 26 per cent of the cholera mortality in 1935. The downward trend in plague mortality which has been in evidence for a period of years past happily continued during 1936, the total deaths for the year being 13,021, a fall of 19,070 or 59% of the figure for 1935. In contrast with these decreases, however, the mortality from smallpox increased by 14,102 or 16% of that for the previous year. The heterogeneous group of deaths recorded under 'fevers' decreased by about 4 per cent., whilst small percentage increases were recorded in the "respiratory diseases" and "dysentery and diarrhœa" groups.

Abbreviations :—
N. W. F. P.—North-West Frontier Province.
C. P.—Central Provinces.
U. P.—United Provinces.
P. M.—*Per mille.*

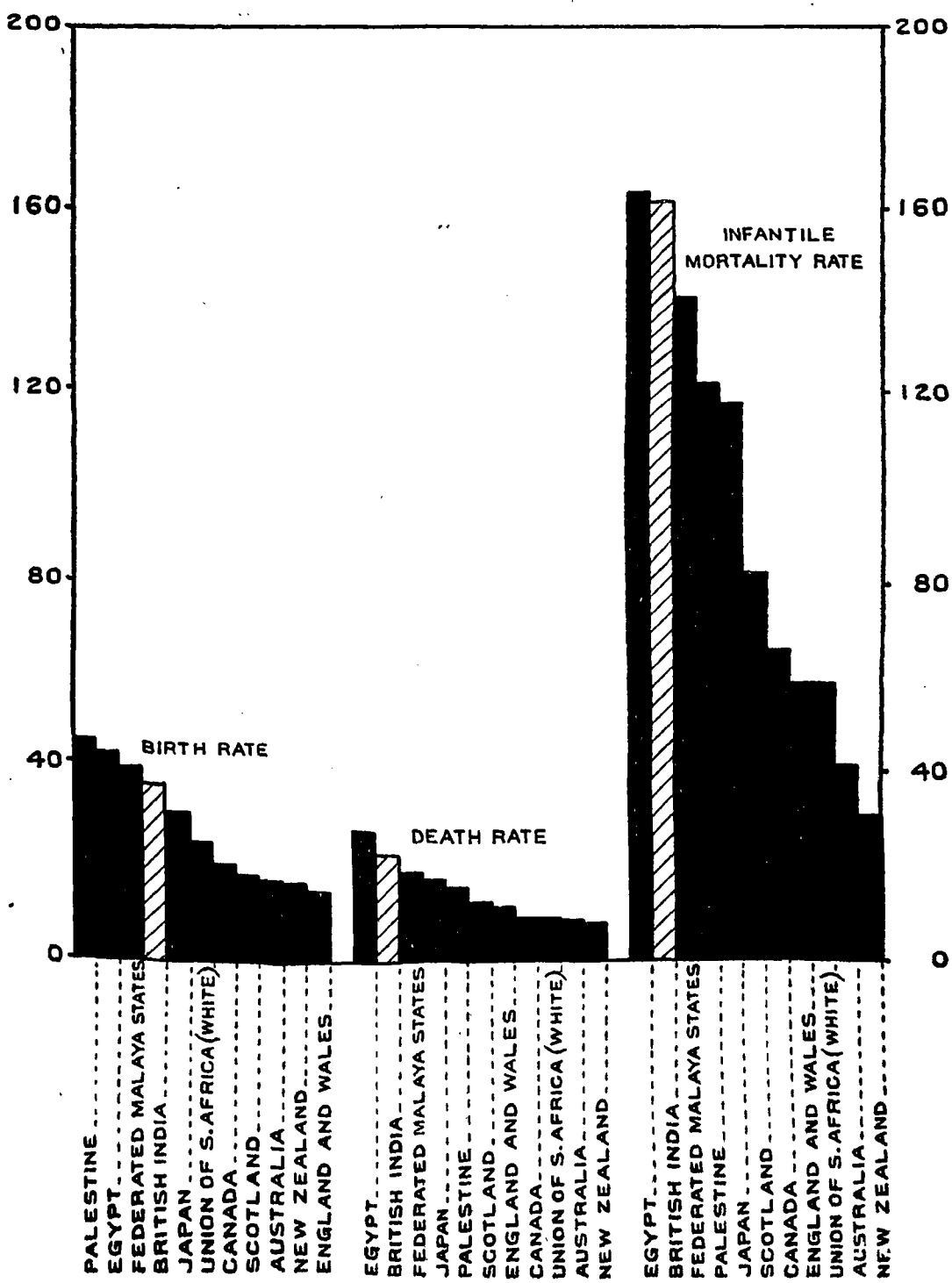
So long as th epresent machinery is the best that can be provided for the registration of vital statistics, no more detailed classification of the causes of death can be introduced. This defect constitutes a serious handicap in many directions. The effects, for instance, of malaria and of tuberculosis, which are responsible for large proportions of the deaths recorded under 'fevers' and 'respiratory diseases' are insusceptible of accurate assessment; it is equally difficult to estimate the incapacity and ill-health caused by diseases like leprosy and filariasis, which are so widely prevalent in different parts of the country.

In this great sub-continent epidemic diseases of different kinds exhibit rises and falls in incidence from year to year, which go largely unexplained, but their collective effect on the general health of the population is of a much lesser degree than might be anticipated by the epidemiologist unacquainted with Indian conditions. Whilst within recent years a few of India's many diseases have been the subject of investigation from the epidemiological point of view, there still remains a vast field awaiting exploration and it is regrettable that so few workers have been attracted to this important side of research work. Until further scientific investigations have been carried out and the lessons to be learned from these investigations are applied in practical form for the betterment of the public health, it will be profoundly difficult to create and maintain conditions essential to a healthy life. In the west, where within the last 60 years or so great progress has been made in raising the general standards of health, the preventive campaign was based on an improvement of environmental hygiene and on the development of health services whose function was to promote the care of the individual throughout his whole life. Disease has been defined as "the dissociation of the functional unity" of the human body and public health endeavour, in so far as it attempts to create conditions inimical to such dissociation, must take note of the environment in which man lives and of the man himself. "Nothing is more certain than the fact that the physical advancement and health of mankind is dependent not upon a 'doctor's stunt' here or a 'sanitary institution' there, but upon the whole social environment and evolution of the people." In India, the solution of the problems associated with physical health and social environment is complicated by the evils of ignorance and poverty to which is commonly added a fatalistic outlook arising, it may be, from the low standard of life which has been the experience of so many generations past. In a country like India, indeed, where the staple industry must continue to be agriculture,—an industry largely dependent for its success on monsoon rains well known to be painfully variable,—it is an unfortunate fact that economic stability is almost impossible of achievement. In making that statement, it is not forgotten that large and small irrigation projects have relieved the situation in different areas nor that the development of other industries has given considerable relief to a percentage of the population. Even so, the main task lying before Indian Governments is the organisation of rural life so that the villager may become more self-reliant and self-respecting and that he may be led to a healthier and happier life. The progress of the country is so bound up with the welfare of the agricultural population that it is not surprising that within recent years increasing attention has been paid to this subject both by politicians and social workers. The public health aspects of what is generally known as rural reconstruction are of such vital importance that it has been made the subject of a separate note. This has been included in Section XII of the present report.

In the chart facing this page and in Table I (*i*) the birth and death rates per 1,000 of population and infantile death rates per 1,000 of births for

No. 1

A COMPARISON OF BIRTH, DEATH AND INFANTILE MORTALITY RATES OF INDIA WITH OTHER COUNTRIES IN 1936



British India during 1936 are compared with the corresponding figures of a number of other countries.

TABLE I (*i*).

	Birth rate per mille.	Death rate per mille.	Natural increase per mille.	Infantile death rate per 1,000 births.
British India	**35·4**	**22·6**	**12·8**	**162**
England and Wales	14·8	12·1	2·7	59
Federated Malay States	38·7	19·2	19·5	142
Japan	29·9	17·5	12·4	117
Palestine	44·9	16·1	28·8	122
Egypt	41·8	27·3	14·5	164
Scotland	17·9	13·4	4·5	82
Australia	17·1	9·4	7·7	41
Canada	20·0	9·7	10·3	66
New Zealand	16·6	8·7	7·9	31
Union of South Africa (White)	24·2	9·6	14·6	59

Population.

2. Table I (*ii*) gives the estimated mid-year population of British India and of the individual provinces, with additional columns showing percentage increases for 1936 and for the period from the 1931 census to the mid-year 1936. Table I (iii) gives estimated sex and age distributions for the same year. Owing to the recent redistribution of territories consequent on the formation of the new provinces of Orissa and Sind, birth and death statistics for the newly constituted areas during the previous five years were not easily available. In consequence, it has not been possible to utilise the natural increase method which has been in use during the past few years. The estimated mid-year populations given for these two provinces have, therefore, been arrived at by the application of other methods, but any error arising therefrom is unlikely to be large. With respect to the Central Provinces and Madras Presidency the estimated populations given by the Directors of Public Health in their annual reports have been adopted. In view of the redistribution of territories, the percentages of increase of population have been given in certain instances in groups.

TABLE I (ii).

	Estimated population, 30th June 1935.	Estimated population, 30th June 1936.	Percentage increase or decrease.	Total percentage increase from 1st March 1931 to end of June 1936.
British India	**278,199,545**	**281,866,639**	**1·3**	**6·1**
N.-W. F. P.	2,458,567	2,492,842	1·4	5·7
Punjab	25,022,053	25,556,656	2·1	8·9
Delhi	672,570	685,792	2·1	7·8
U. P.	50,898,213	51,673,414	1·5	6·7
Bengal	51,231,433	51,674,916	0·9	3·6
Bombay Sind	22,893,058	23,353,837	2·0	7·1
Bihar Orissa C. P. Madras	103,355,917	104,514,714	1·1	6·3
Coorg	164,790	164,700	0·06	0·8
Assam	8,277,099	8,356,513	1·0	5·4
Burma	12,649,116	12,808,030	1·3	5·8
Ajmer-Merwara	576,729	585,225	1·5	4·5

TABLE I (iii).

Estimated population, 30th June, 1936, by sex and age.

	Males.	Females.	Total.
All ages	145,116,367	136,750,272	281,866,639
0—5 years	20,750,431	21,095,805	41,846,236
5—10 ,, ...	19,008,111	17,233,176	36,241,287
10—15 ,, ...	17,457,862	15,334,449	32,792,311
15—20 ,, ...	13,231,007	13,139,821	26,370,828
20—30 ,, ...	25,255,302	25,128,658	50,383,960
30—40 ,, ...	20,799,473	18,566,652	39,366,125
40—50 ,, ...	14,295,047	12,519,944	26,814,991
50—60 ,, ...	8,542,445	7,946,889	16,489,334
60 years and upwards . .	5,776,689	5,784,878	11,561,567

These tables indicate that there has been during 1936 no falling off in the general rate of population growth. From the middle of 1931 to the middle of 1936 the annual rates of growth have been 0·9%, 1·4%, 1·2%, 0·9% and 1·3% respectively. Between the census of 1931 and June 1936, *i.e.*, in 5 years and 4 months the total increase has been 6·1%. Assuming the same rate of growth during the next 5 years, the increase in population during the decennium 1931-1941 is, therefore, likely to be something over 11%. The chances are, however, that these yearly estimates, based on recorded births and deaths will prove to be underestimates of actual events. Births escape registration more readily than deaths, because the necessity for the disposal of a dead body renders inevitable the notification of death. The actuarial report incorporated in the 1931 census of India, Vol. I, part I, showed that, in the case of most provinces, there were appreciable discrepancies between enumerated populations at the 1931 census and estimated populations based on the balance of births over deaths during the period, 1921-31, only Madras Presidency showing an insignificant error, *viz.*, one of 0·05 %. In all provinces, with a single exception, the estimates fell short of the census enumerations, the errors being as large as 10·39% in Assam, 6·83% in Burma, 4·48% in Bombay, and 4·19% in Bengal. It is probably safe to assume that the experience of the present decade is unlikely to be very different and that the estimated 11% increase will prove to be less than the real addition to numbers. On more than one occasion in recent years it has been stated in these reports that the population of India as a whole will reach by 1941 a figure approximating to 400 millions, which would mean a rate of increase of about 13·4%. In so far as existing trends indicate, there is little reason to doubt that this figure will be reached.

The urgent importance of an organised study of the population problem has been repeatedly emphasised in these health reports. The recurring references to this question have not been made for the purpose of raising alarm or of depicting the future in colours of despair. The truth is that the problem of numbers has exercised the mind of man even from the remote past, because adjustment of numbers to the resources that man is able to extract from his environment is a fundamental condition of his individual and social well-being. In the past that adjustment has often been fortuitous or by unnecessary payment by the community in terms of pain and suffering. With the increasing mastery that man continues to acquire over nature and with the development of altruistic ideals he has turned more and more to long-term planning and co-operative effort as suitable methods by which he can mould his destiny. In trying to estimate the possible trend of events in India, consideration must be given to a number of factors all of which are

of importance. These include the low standard of life at which the majority of the people live, the large additions to numbers amounting at present to about 35-40 millions per decade, the high toll of life and suffering taken annually by epidemic and other preventable diseases and, lastly, the question of food production. It may be that the information relating to food production is not complete enough to permit one to judge whether the growth of population is outstripping available food resources, for it has been stated that estimates of food production in India are unreliable and in most cases under-statements and that increases in production due to improved methods have not been taken into consideration in estimating the yield per acre.

Dr. W. R. Aykroyd, Director of the Nutrition Research Laboratories at Coonoor, has recently made a study of Madras Presidency in regard to its food supply and the nutritional requirements of the population of the province. In the course of his report, Dr. Aykroyd has stated :—

"Two thousand five hundred calories per consumption unit may perhaps be taken as representing requirements per consumption unit in the tropics. The estimate of total calories per consumption unit suggests that the total food available is just sufficient to cover the energy needs of the population, provided it is evenly distributed. But, of course, it is not evenly distributed. It seems clear that there is no appreciable excess of supply over requirements and probably the imports of rice and other foods are necessary to supplement internal production".

Dr. Aykroyd further says that the supply of protein was low and that of animal protein was almost negligible. Milk production was very small and the mass of the population consumed little or no milk. There was an almost total lack of vitamin A in the foodstuffs available as also a deficiency of vitamin B.

"Owing to shortage of milk and eggs, fruit and vegetables are of importance as a source of other vitamins and mineral salts and if, as seems likely, vegetables and fruit are consumed in small quantities by the mass of the population, there must be a certain deficiency as regards these food factors also.

"If, as would appear, the existing cultivated area in the Presidency can supply barely enough food, chiefly in the form of cereals, pulses and vegetable fats, to satisfy the energy needs of the population, then, clearly, it is impossible to devote large areas of land already under cultivation to milk production either as grazing land or as land under forage crops. Three or four times as much land is required for the production of a given number of calories in the form of milk as in the form of cereals, pulses or vegetable fats."

This investigation is of particular value because Dr. Aykroyd has attempted to assess the actual position in regard to the nutritional requirements of the population, which include the provision of food of an adequate quantity and of a desirable level of quality. Other authorities have expressed views which support the inferences to be drawn from Dr. Aykroyd's investigation. Professor R. A. Fisher, Galton Professor of Eugenics at the University of London, in the course of an address given recently at the Population Research Institute in Lucknow stated :—

"The menace of over-population is the basic issue in India to which problems of removal of illiteracy, rural reconstruction and improvement of public health are subsidiary. For all such programmes are deferred or frustrated as population outruns the capacity of education, sanitation and rural recovery. Economic adjustment seems to lie more in the direction of a judicious combination of food and industrial cropping than in subsistence farming, more in agricultural than in general industrialization and, above all, more in the control of population increase than in the diversification of employment.

The task that confronts India is no academic one ; what is required is that the present low standard of living should be definitely raised. It is certain that no solution of this vast problem will be reached without

concentrated effort and without the active participation of all sections of the community.

In this connection the remarks of His Excellency the Viceroy at the inaugural meeting of the Central Board of Health in June, 1937, may be appropriately quoted.

"When I returned to India more than a year ago, I set myself to establish in the public mind the essential relationship between each of three orders of life ; the life of the Plant, the life of the Animal, and the life of the Man—or in other words the direct connection between agricultural progress, improved animal husbandry and human welfare, nutritional and economic. During the same period I have urged on every available occasion the completion of that chain of research and propaganda bodies whose existence would connote the recognition by Governments everywhere of the vital, the over-whelming importance to India of the trinity to which I have referred."

Agricultural, irrigation and veterinary research and the application of their results to the problems of the country are gradually being extended both at the Centre and in the Provinces and these efforts are already bearing fruit. Agricultural research, for example, has within recent years covered a wide field, such as protection of crops from pests and diseases, irrigation and fertilisers, soil examination and, what is even more important, the question of co-ordination of agricultural and nutritional studies for the improvement of human nutrition is now being actively pursued.

The cattle and dairy industries are also important both from the point of view of raising the economic status of the people and of improving their nutrition. Dr. N. C. Wright in his recent report remarked :—

"The actual and potential value of cattle products is very great. Milk and milk products may be valued at about 300 crores of rupees. This is roughly equivalent to the value of India's total output of rice and is three to four times the value of the output of wheat. Cattle are also valuable from another point of view. The cash value of cattle manure in raising the fertility of the soil has been estimated at 270 crores of rupees."

The resources of this country are therefore immense, but they will become available for the betterment of the people only by a well-planned campaign of economic development. No campaign of the kind can be held to be well-planned, however, if it has not taken into consideration the problems associated with a rapidly growing population. At present lack of information stands in the way of a correct appreciation of the situation. Data relating to food production are incomplete. Investigation of the trend of population growth is not easy because of the defective statistics relating to the fertility of women. Few accurate observations have so far been made of the existing standards of nutrition in different parts of the country and amongst different communities. These and other questions all demand detailed study before the real position can be determined and before ameliorative measures can be planned. In fact, no real solution of the problem is possible of attainment without organisation of all the resources of this country and that presages a well-informed and intelligent public opinion.

Within the limits of this report, it is obviously impossible to give a comprehensive review of the problems associated with population. All that has been attempted in the preceding paragraphs is to draw attention to certain aspects of a question which is of paramount importance to the health and well-being of the nation, in the hope that the educated public will be brought to realise the magnitude and urgency of the problem and will give it the studious thought which it undoubtedly deserves.

Live-births.

3. The total number of live-births recorded in British India during the year was 9,981,143, this figure being 2·9 per cent more than that for 1935 and 6·5 per cent more than the mean for the quinquennium 1931-35. In last year's report it was stated that the 1935 total was a record ; the number for 1936 constitutes another new record. The crude birth rate was 35·4 p. m.

Table I (*iv*) gives the numbers of registered births and rates *per mille* for both sexes based on the estimated populations of the different provinces.

TABLE I (*iv*).

	Births.			Rate p. m.		No. of males born per 100 females in 1936.
	M.	F.	Total.	1936	1935	
British India	**5,185,468**	**4,795,675**	**9,981,143**	**35·4**	**31·9**	**108**
N.-W. F. P.	43,476	33,522	76,998	31	31	130
Punjab	579,953	519,193	1,099,146	43	43	112
Delhi	16,127	14,732	30,859	45	43	109
U. P.	999,775	887,823	1,887,598	37	34	113
Bihar	587,616	556,392	1,144,008	33	33	106
Orissa	130,821	123,876	254,697	36		106
Bengal	868,183	805,023	1,673,206	32	32	108
C. P.	333,638	317,630	651,268	39	43	105
Bombay	382,054	360,277	742,331	39	35	106
Sind	44,175	35,361	79,536	19		125
Madras	849,745	809,880	1,659,625	36	35	105
Coorg	2,026	1,884	3,910	24	25	108
Assam	123,839	115,865	239,704	29	29	107
Burma	211,563	203,201	414,764	32	32	104
Ajmer-Merwara	12,477	11,016	23,493	40	37	113

Male births outnumbered female births not only in British India as a whole but in every province. This is a phenomenon common to most countries, but, whilst in other parts of the world, the ratio usually is about 106 males to 100 females, in certain provinces of India the variation is much higher. In N.-W. F. Province, for instance, the figure is 130, in Sind 125, in the United Provinces and Ajmer-Merwara 113, and in the Punjab 112. At the other end of the scale, it was as low as 105 in Madras and 104 in Burma. This experience is not peculiar to the present year and, broadly speaking, the populations of the north-western parts of India produce an unusually large proportion of male births whilst, in other parts of the country, the ratio falls to a figure comparable with other races. It is not proposed to enter into a discussion of the possible causes of the wide variations recorded in different parts of India as, in the light of present knowledge, that would be mere speculation.

The highest birth rate was recorded in Delhi province, but in the Punjab and in Ajmer-Merwara the rates were only slightly smaller. The low rates recorded in Coorg, Sind and Assam were almost certainly the result of defective registration work.

Rural and urban birth rates, details of which are given in Table C, Appendix I, were nearly equal in N.-W. F. Province, Delhi, Assam and Burma. In other provinces, they differed from each other to a marked extent,

the rural rate being higher in the provinces of the Punjab, Bihar, Orissa, Bengal and Bombay, whilst in other cases the urban rate was the higher.

The registration of births has improved considerably during recent years, but abnormally low rates are still to be met with. For instance, in the Punjab, ten towns recorded birth rates below 20 p. m. whilst in five other towns the figure was less than 5 p. m. In one town with a population of 7,018 the registered birth rate was only 1·57 p. m.! Similar instances could be given from other provincial reports.

A birth rate based on total population does not give a satisfactory measure of the real fertility rate. It is only during the reproductive period that women bear children and married women make much the largest contribution in the matter of births. In India, however, registration of marriage is not a civil institution in either of the two large communities which together comprise over 90% of the total population. Further, figures for married persons are available only for the census years. On the assumption that the proportions of married persons in the respective age groups at the 1931 census hold good for 1936, rates for (*a*) all women aged 15-40 and (*b*) married women at the same ages have been calculated and these are shown below for British India and the individual provinces. The legitimate birth rate per 1,000 married women, aged 15—45, in England and Wales for 1935 has been given for comparison.

TABLE I (*v*).

	Female Population 15-40 years.	Total births.	Rate p. m. based on total female population, 15-40 years.	Rate p. m. based on married female population 15-40 years.
England and Wales (1935)	..	..	..	111·9
British India . .	**56,835,131**	**9,981,143**	**175·6**	**212·5**
N.-W.-F. P. . . .	475,830	76,998	161·8	201·0
Punjab	4,524,480	1,099,146	242·9	288·6
Delhi	128,858	30,859	239·5	271·7
U. P.	10,136,881	1,887,598	186·2	186·2
Bihar	6,973,261	1,144,008	164·1	195·9
Orissa	1,648,695	254,697	154·5	
Bengal	10,711,115	1,673,206	156·2	189·3
C. P.	3,381,942	651,268	192·6	217·3
Bombay . . .	3,852,210	742,331	292·7	208·6
Sind . . .	798,957	79,536	99·6	
Madras	9,847,032	1,659,625	168·5	212·3
Coorg	33,398	3,910	117·1	161·4
Assam	1,615,999	239,704	148·3	182·8
Burma	2,592,953	414,764	260·0	255·2
Ajmer-Merwara . .	113,520	23,493	206·9	234·3

The figure for British India is almost double that of England and Wales although it is to be noted that the rates are not strictly comparable because in the former the age-groups cover the period, 15—40, and in the latter they are for the period, 15—45 years. Further, in the figures for England, illegitimate births have been excluded, whilst in India this separation is not possible, as births are not registered as legitimate and illegitimate. The error due to the inclusion of illegitimate births in India is not, however, likely to be large,

so that the great disparity between English and Indian fertility rates is little affected by this difference. The high fertility rate in this country is, therefore, an important factor in relation to the growth of population, in spite of the fact that mortality rates remain at a high level.

Natural increases accruing from excess of births over deaths for decennial periods between 1871 to 1930 and for individual years from 1931 to 1936 are given below in Table I (*vi*).

TABLE I (*vi*).

	Annual number of births.	Birth rate p. m.	Annual number of deaths.	Death rate p. m.	Annual excess of births over deaths.
1871—1880	Not available.		3,540,202	20	..
1881—1890	4,565,687	24	5,058,578	26	492,891
1891—1900	7,174,694	34	6,662,417	31	512,277
1901—1910	8,591,136	38	7,657,513	34	933,623
1911—1920	8,810,018	37	8,142,364	34	667,654
1921—1930	8,345,364	35	6,347,063	26	1,995,301
1931	9,135,890	35	6,615,099	25	2,520,791
1932	9,054,506	34	5,805,666	22	3,248,840
1933	9,678,876	36	6,096,787	22	3,582,089
1934	9,288,897	34	6,856,244	25	2,432,653
1935	9,698,794	35	6,578,711	24	3,120,083
1936	9,981,143	35	6,375,731	23	3,605,412

In England and Wales for the period 1841—1935, the largest numbers of births were ordinarily recorded during the second quarter of the year though occasionally the peak occurred in the first quarter. Quarterly figures for British India in 1936 are given below :—

TABLE I (*vii*).

	1st Quarter.	2nd Quarter.	3rd Quarter.	4th Quarter.
British India	**2,416,202**	**2,191,650**	**2,572,500**	**2,800,791**
N.-W. F. P.	20,856	18,127	19,006	19,009
Punjab	279,930	217,171	285,002	317,043
Delhi	6,897	5,691	9,021	9,250
U. P.	450,785	391,933	517,034	527,846
Bihar	287,040	252,543	301,868	302,557
Orissa	52,459	69,991	68,015	64,232
Bengal	475,510	355,489	324,643	517,564
C. P.	150,576	143,809	178,866	178,017
Bombay	172,690	179,675	199,587	190,379
Sind	20,007	15,807	20,208	23,514
Madras	329,461	387,499	433,925	458,740
Coorg	992	1,010	1,087	821
Assam	67,872	46,511	49,817	75,504
Burma	95,702	101,128	107,967	109,967
Ajmer-Merwara	5,425	5,266	6,454	6,348

For the country as a whole and in a majority of the provinces, the highest incidence of births occurred during the fourth quarter of the year. In Orissa the highest number was recorded during the second quarter.

Deaths.

4. Deaths in British India during 1936 numbered 6,375,731, this figure being about 3·1% less than that for 1935 and about 0·2% less than the mean for the 1931-35 quinquennium.

The crude death rate was 22·6 p. m. or 1·0 p. m. lower than that for 1935. During recent years the death rate has shown a tendency to fall. It has been pointed out that the specific mortality rates for males and females have shown a decline from 1921 onwards, except in the age-group, 60 years and upwards :—

"The suggestion is that the fall in mortality shown in recent years is a real one and that the death rate is not likely to show an upward trend at least in the near future. This assumption is strengthened by the fact that in British India, to which these figures relate, the population aged '60 and upwards' forms only a small proportion of the total (about 4%), while about 50% of both sexes are between the ages 15 to 50 years, during which the rates of mortality are lower than at either end of life."

Registration of deaths is always more satisfactory than that of births so that it may be said that throughout India during 1936 conditions were relatively healthy. At the same time, attention must be drawn to the fact that the accuracy of death registration varies considerably in different parts of the country. For instance, the recorded rate in Sind of 11·5 p. m., which is only about half the all-India rate, definitely suggests a high degree of error in registration.

The female mortality rate exceeded that for males in Delhi Province by 6·6 p. m., in Coorg by 2·4 p. m., in Ajmer-Merwara by 0·6 p. m., in the Punjab by 0·5 p. m., in Bombay by 0·3 p. m. and 0·2 p. m. in Assam. It is worth noting here that in 1935 also Delhi and Coorg showed relatively high figures in respect of excess of female over male mortality, the differences being 7 p. m. and 2 p. m., respectively. No explanation can be given for these large differences.

Male and female death rates for British India and for individual provinces during 1936 are given below :—

TABLE I (*viii*).

	Deaths.			Death rate p. m.		
	M.	F.	Total.	M.	F.	Total.
British India .	**3,337,019**	**3,038,712**	**6,375,731**	**23·0**	**22·2**	**22·6**
N.-W. F. P. .	23,476	18,781	42,257	17·4	16·4	17·0
Punjab .	302,644	259,648	562,292	21·8	22·3	22·0
Delhi . .	8,308	8,013	16,321	21·0	27·6	23·8
U. P. . .	586,568	508,109	1,094,677	21·6	20·7	21·2
Bihar . .	369,974	331,840	701,814	21·5	19·4	20·5
Orissa . .	95,347	98,241	193,588	28·0	26·2	27·0
Bengal . .	635,630	587,094	1,222,724	23·7	23·7	23·7
C. P. . .	280,681	253,870	534,551	34·0	30·7	32·4
Bombay .	255,947	241,331	497,278	25·8	26·1	26·0
Sind . .	27,259	21,166	48,425	11·5	11·5	11·5
Madras . .	521,549	502,290	1,023,839	22·6	21·4	22·0
Coorg . .	2,065	1,840	3,905	22·6	25·0	23·7
Assam . .	81,498	74,103	155,601	18·5	18·7	18·6
Burma . .	138,691	125,682	264,373	21·3	20·0	20·9
Ajmer-Merwara	7,382	6,704	14,086	23·8	24·4	24·1

In comparing the mortality rates of different areas certain fallacies which are likely to creep in should be borne in mind. Death rates for specific age periods differ widely, as also do those for the two sexes at the same periods. For both sexes the two extremes of life always have the highest mortality rates, whilst they are at their lowest for the age-period 10—15 years. As regard sex rates, in India female mortality rates are higher than male rates for all reproductive age periods, the opposite being the case for other ages. Before rates for different areas become comparable, however, differences in age and sex composition must be eliminated. An attempt has been made by using the 'direct' method, to calculate "standardised death rates," as they are called, for the different provinces and these are set out in the following table along with the corresponding crude death rates.

TABLE I (*ix*).

	Standardised death rates p. m.	Crude death rates p. m.
N.-W. F. P.	17·1	17·0
Punjab	20·5	22·0
Delhi	25·6	23·8
U. P.	21·2	21·2
Bihar	21·3	20·5
Orissa	28·2	27·0
Bengal	24·0	23·7
C. P.	31·1	32·4
Bombay	26·6	26·0
Sind	12·3	11·5
Madras	22·1	22·0
Coorg	25·6	23·7
Assam	25·2	18·6
Burma	21·1	20·6
Ajmer-Merwara	24·2	24·1

With the exceptions of the Central Provinces and the Punjab, which showed decreases and the United Provinces which was unchanged, the effect of standardisation has been to raise provincial death rates, although the increases in most cases are small. Assam shows a high increase of 6·6 p. m. but in other areas the increase ranges between 1·9 p. m. and 0·1 p. m. These standardised rates are comparable with each other and express the force of mortality in the populations concerned, although the effect of defective registration still remains.

Rural and urban death rates are given in Tables G and H, Appendix I. The rural death rate for British India was 22·3 p. m., a figure less by 1·1 p. m. than that of 1935; the urban death rate remained stationary at 25·3 p. m. The provincial rural death rate declined in all provinces except Burma and Bengal, but the very low figure of 9·7 p. m. recorded in Sind was certainly due to defective registration. The urban rate decreased in the provinces of N.-W. F. P., Punjab, Delhi, U. P., Assam and Ajmer-Merwara, whilst increases were registered in Bengal, C. P., Madras and Coorg. The exceptionally high urban death rates of 52·5 p. m. in 1936 and 51 p. m. in 1935 recorded in Coorg require investigation.

Mention has already been made of the fact that higher rates of mortality prevail among females during the reproductive period as compared with males of the same ages. The figures for 1936, which are given below, confirm the experience of past years.

TABLE I (*x*).

	Deaths, 15—40 years.		Death rates, 15—40 years.	
	Male.	Female.	Male.	Female.
British India	**591,835**	**657,707**	**10·0**	**11·6**
N.-W. F. P.	4,913	4,899	9·2	10·3
Punjab	47,221	46,512	8·6	10·3
Delhi	1,439	1,948	7·4	15·1
U. P.	93,606	99,808	8·3	9·8
Bihar	76,970	71,354	11·3	10·2
Orissa	18,275	23,352	12·8	14·2
Bengal	138,431	162,981	12·3	15·2
C. P.	42,781	46,675	12·8	13·8
Bombay	35,912	43,599	8·6	11·3
Sind	6,400	6,073	6·1	7·6
Madras	79,733	100,758	8·7	10·2
Coorg	636	624	14·0	18·7
Assam	16,566	20,879	10·0	12·9
Burma	27,919	26,973	10·1	10·4
Ajmer-Merwara	1,033	1,272	7·9	11·2

Infantile mortality.

5. In last year's report it was remarked that the infantile mortality rate in 1935 was the lowest on record. During 1936 a further small decrease occurred, the rate falling from 164 p. m. of live births in 1935 to 162 p. m. The problem of infantile mortality in India was discussed at length in the annual report for 1930 where it was pointed out that the apparent decline in the rate, which was particularly noticeable after 1918, might have been due to improved registration. In British India, the rate has declined from 208 p. m. of live births in 1912 to 162 in 1936, with fluctuations in some of the intervening years. A Research Assistant in the Department of Vital Statistics at the All-India Institute of Hygiene and Public Health, Calcutta, has recently investigated the question whether the fall in the rate during recent years was real or apparent. Examination of the figures for British India for the decennium 1926-35 has failed to reveal a statistically significant reduction. This relatively short period was chosen because improved registration has rendered the infantile mortality rates of recent years not comparable with those of an earlier period.

Certain comparisons, made in the same investigation, between the trends of infantile mortality rates in England and Wales and in India are interesting.

No 2

INFANTILE MORTALITY PER MILLE OF LIVE BIRTHS IN BRITISH INDIA DURING 1936

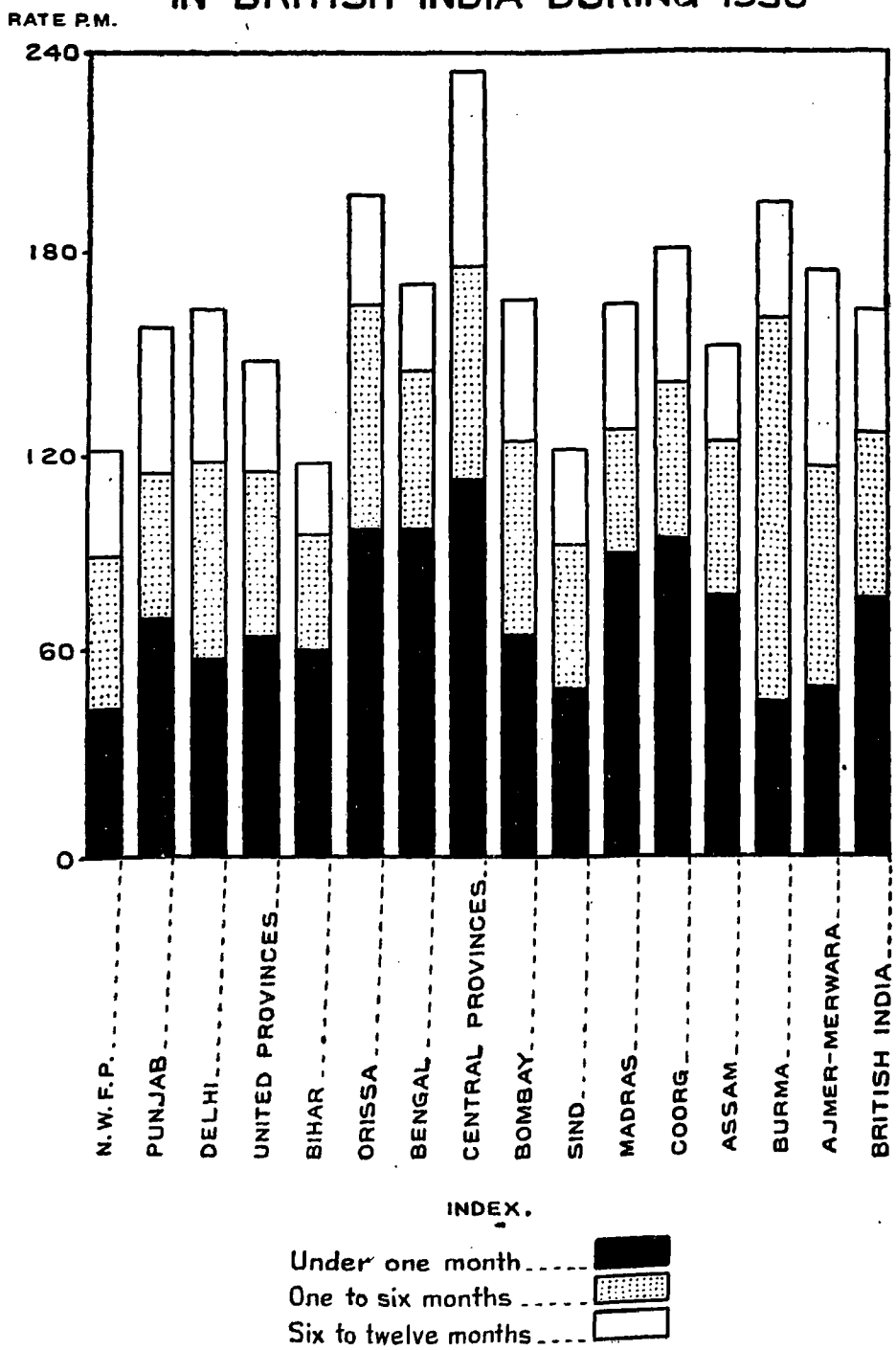


TABLE I (*xi*)..

Means and Ratios of Infant Mortality Rates of British India and England and Wales.

Mean of	India.	England.	Ratio.
1912—16	204	102	2·0
1917—21	217	89	2·4
1922—26	181	73	2·5
1927—31	176	67	2·6
1932—36	173	61	2·8

The ratios in the last column give a rough indication that the decline in the mean quinquennial mortality rates in India has been less than that in England. It is also to be observed that in spite of an appreciable fall in the average recorded infantile mortality rate since 1912, the quinquennial average in this country is now nearly three times that of England whereas, in the early years of the century, it was only twice as high.

The Annual Epidemiological Report of the Health Organisation of the League of Nations for 1935 gives the infantile mortality rates of 46 countries, including British India. Of these, 40 countries recorded lower rates than that of India, the remaining five being the Straits Settlements, Roumania, Chile, Ceylon and Malta. The range of variation in the infantile mortality rates lay between 32 p. m. for New Zealand and 286 p. m. for Malta, whilst nearly one-half of the 40 countries recorded rates over 50% lower than that of India. This comparison indicates how far behind India is in regard to measures for the protection of infant life. A general discussion of the problems associated with maternity and child welfare work will be found in Section III of this report.

Table I(*xii*) sets out the figures for infantile mortality in British India and in the provinces. Decreases occurred in the provinces of Ajmer-Merwara, Madras, Delhi, Assam, N.-W. F. Province, Bihar and United Provinces while the other provinces recorded increases.

TABLE I (*xii*).

	Under one month.		One to six months.		6—12 months.		Total deaths under one year.	Death rate per 1,000 live births	
	Number.	% of total.	Number.	% of total.	Number.	% of total.		1936.	1935.
British India .	**766,372**	**47·3**	**506,502**	**31·2**	**347,942**	**21·5**	**1,620,816**	**162·4**	**164**
N.-W. F. P. .	3,294	35·1	3,538	37·8	2,540	27·1	9,372	121·7	132
Punjab .	76,206	43·8	50,175	28·8	47,763	27·4	174,144	158·4	155
Delhi .	1,779	35·4	1,881	37·5	1,364	27·1	5,024	162·8	177
U. P. .	120,016	42·8	97,695	34·8	62,648	22·4	280,359	148·5	157
Bihar .	68,266	50·6	41,118	30 5	25,586	18·9	134,970	118·0	129
Orissa .	24,597	48·6	17,298	34·2	8,756	17·3	50,651	198·8	
Bengal .	161,496	56·5	81,036	28·3	43,424	15·2	285,956	170·9	159
C. P. .	72,946	47·7	41,973	27·4	38,117	24·9	153,036	235·0	224
Bombay .	47,629	38·6	44,468	36·1	31,192	25·3	123,289	166·1	164
Sind .	3,918	40·6	3,323	34·4	2,408	25·0	9,649	121·5	
Madras .	147,127	54·0	04,110	23·5	61,156	22·5	272,393	164·1	179
Coorg .	366	51·6	185	26·1	158	22·3	709	181·3	171
Assam .	18,494	51·2	11,189	30·9	6,469	17·9	36,152	150·8	163
Burma .	19,052	23·5	43,950	58·0	15,020	18·5	81,022	195·3	186
Ajmer-Merwara .	1,186	28·9	1,563	38·3	1,341	32·8	4,090	174·1	208

A striking fact presented by the figures in this table is that for British India as a whole, about 47% of the total infantile mortality takes place within the first month of life. The subsequent periods, 1—6 months and 6—12

months, are relatively less fatal. The neonatal mortality figure is over 50% of the total infant mortality in the provinces of Bihar, Bengal, Madras, Coorg and Assam ; in Burma this figure is as low as 23·5%, but the mortality during the next period of life, 1—6 months, is abnormally high, 58·0%, in comparison with the other provinces. In the opinion of the Director of Public Health, the high death rate during this period is due to the practice of feeding infants with solid food after the first month of life.

Infant mortality during the first month of life is largely dependent on factors influencing ante-natal life, particularly so in the case of deaths within the first week. During 1936, the deaths under one week formed 28% of the total infantile mortality and 60% of the deaths within one month, as may be seen from Table I(*xiii*). These figures emphasise the urgent necessity for the wide development of ante-natal campaigns in every province.

During subsequent months environmental influences begin to affect child life to a greater extent and experience of child welfare work in western countries has shown that a reduction of mortality in the first month of life is more difficult of attainment than in subsequent periods. In England "in 1907 the rate of mortality per 1,000 live births in the first month of life was 40·7, in 1935, 30·4. In the sixth to twelfth month it was 32·4 in 1907 and 9·7 in 1935. In the first month the decline is 10·3 per 1,000, in the last six, 22·7 ". In India, figures for infantile deaths classified into separate age periods are available only from 1920. In that year infantile deaths under one month formed 85·8 p. m. of live births while in 1936 the proportion was 76·8 p. m. Corresponding figures for the second six months of infant life were 43·0 p. m. and 34·9 p. m. respectively. During the period, 1920—36, therefore, deaths during the first month of life decreased by 9·0 p. m. whilst during the 6—12 months period, the decrease was 8·1 p. m. It is probable that this apparent fall in mortality is, in both cases, mainly due to improvement in the registration of births. If it had been the result of public health effort, the difference between the decreases in the two cases would have been greater and more comparable with the English figures.

TABLE I (*xiii*).

	Deaths under one week.	Rate p. m. live-births.	Percentage of: Deaths under one month.	Percentage of: Total infant deaths.
British India	**458,369**	**45·9**	**59·8**	**28·3**
N.-W. F. P.	1,703	22·1	51·7	18·2
Punjab	42,389	38·6	55·6	24·3
Delhi	1,011	32·8	56·8	20·1
U. P.	77,521	51·1	64·6	27·7
Bihar	48,601	42·5	71·2	36·0
Orissa	14,324	56·2	58·2	28·3
Bengal	91,928	54·9	56·9	32·1
C. P.	31,895	49·0	43·7	20·8
Bombay	26,698	36·0	56·1	21·7
Sind	2,088	26·3	53·3	21·6
Madras	99,045	59·7	67·3	36·4
Coorg	211	54·0	57·7	29·7
Assam	10,143	42·3	54·8	28·1
Burma	10,157	24·5	53·3	12·5
Ajmer-Merwara	655	27·9	55·2	16·0

Provincial urban and rural infantile mortality rates are given in Tables M and N of Appendix I of this report. In British India the recorded rural infantile mortality rate was about 75% of that recorded in urban areas. Of the provinces, Burma reported practically the same rate for both types of area whilst, in the N.-W. F. P., Punjab, U. P., Bihar, Bengal, C. P., Bombay, Sind, Madras and Ajmer-Merwara, the rural rate was smaller than the urban. In other provinces the urban rate was the higher. The rates for municipalities with a population of 30,000 and over showed wide variation, the rate in New Delhi (71·3) being the lowest and that in Mymensingh (375·3) in Bengal the highest.

Male and female infantile deaths are shown below for British India and the provinces. The male mortality rate was higher than that of females in most of the provinces, the exceptions being Sind, Coorg and Ajmer-Merwara.

TABLE I (*xiv*).

	Infant deaths.		Rates p. m. live births.	
	Males.	Females.	Males.	Females.
British India	**886,367**	**734,449**	**170·9**	**153·1**
N.-W. F. P.	5,479	3,893	126·0	116·1
Punjab	95,117	79,027	164·0	152·2
Delhi	2,659	2,365	164·9	160·5
U. P.	155,612	124,747	155·6	140·5
Bihar	74,475	69,495	126·7	108·7
Orissa	26,875	23,776	205·4	191·9
Bengal	155,484	130,472	179·0	162·1
C. P.	83,841	69,195	251·2	217·8
Bombay	67,226	56,063	175·9	155·6
Sind	5,227	4,422	118·6	125·1
Madras	148,356	124,037	174·6	153·2
Coorg	362	347	178·6	184·1
Assam	19,630	16,522	158·5	142·6
Burma	43,860	37,162	207·3	174·3
Ajmer-Merwara	2,164	1,926	173·4	174·8

Table I(*xv*) gives the chief causes of mortality in infants in Bombay City during the years 1932 to 1936.

TABLE I (*xv*).

	1932.	1933.	1934.	1935.	1936.
All causes.	**6,298**	**8,320**	**8,253**	**8,455**	**8,946**
Smallpox	69	717	33	306	214
Measles	16	18	27	60	42
Malaria	4	9	9	9	3
Remittent and undefined fever	147	167	186	146	114
Diarrhœa and enteritis	280	414	455	425	539
Dysentery	27	19	40	41	48
Debility, malformations and premature births.	2,685	3,019	3,384	3,280	3,651
Respiratory diseases	2,217	2,828	2,983	3,039	3,174
Convulsions	422	594	562	563	683
Other Causes	431	535	574	586	478

The large figures in the above table for the two grouped causes, " debility, malformations and premature birth " and " respiratory diseases" are interesting. It might be expected that a majority of the deaths in the first group would occur within the first month of life and those of the second group during subsequent months, because the first group relates mainly to pre-natal causes and the second to environmental influences. That this expectation is correct is proved by the following figures which are quoted from the Health Officer's report.

	Age—periods.			
	Under 1 week.	1 to 4 weeks.	4 weeks to 6 months.	6 to 12 months.
Infantile debility, prematurity, malformation, etc.	88·3	75·6	22·4	..4·7
Respiratory diseases . . .	1·0	3·8	46·7	67·2

The figures in this statement represent the percentages of the deaths due to the specific group of causes to the total number of deaths at the particular age-period. The first group of causes declines progressively as the infants grow older, whilst the second group steadily increases.

A high infantile mortality is generally associated with a relatively high death rate in the subsequent years of child life, because many of those who do not die during the first year are maimed and their resistance to disease is in consequence proportionately reduced. In Table I(*xvi*) are set out the figures relating to mortality under 10 years of life. Corresponding rates are also given for England and Wales during 1934 for comparison.

TABLE I (*xvi*).

	Under one year.	% of total deaths.	1—5 years.	% of total deaths.	5—10 years.	% of total deaths.	Total under 10 years.	% of total deaths.
England and Wales (1934) .	...	7·3.	...	3 2	...	1·6	...	12·1
British India . . .	**1,620,816**	**25·4**	**1,144,372**	**17·9**	**344,152**	**5·4**	**3,109,340**	**48·8**
N.-W. F. P. . .	9,372	22·2	7,027	16·6	2,379	5·6	18,778	44·4
Punjab . . .	174,144	31·0	96,174	17·1	30,532	5·4	300,850	53·5
Delhi	5,024	30·8	2,700	16·5	621	3·8	8,345	51·1
U. P.	280,359	25·6	222,927	20·4	46,058	4 2	549,344	50.2
Bihar	134,970	19·2	144,873	20·6	43,554	6·2	323,397	46·0
Orissa	50,651	26·2	28,891	14·9	9,240	4·8	88,782	45·9
Bengal	285,956	23·4	189,738	15·5	89,101	7·3	564,795	46·2
C. P.	153,036	28·6	120,470	22·5	26,935	5·0	300,441	56·2
Bombay	123,289	24·8	105,933	21·3	22,038	4·4	251,260	50 5
Sind	9,649	19·9	46,687	13·8	2,330	4·8	18,666	38·5
Madras	272,393	26.6	159,897	15·6	48,033	4·7	480,323	46·9
Coorg	709	18·2	421	10·8	205	5·2	1,335	34·1
Assam	36,152	23·2	25,113	16·1	10,823	7·0	72,088	46·3
Burma	81,022	30·6	30,556	11·6	11,866	4·5	123.444	46·6
Ajmer-Merwara . . .	4,090	29·0	2,965	21·0	437	3·1	7,492	53·2

The great disparity between English and Indian rates at every age period is striking. In India, about 49% of the total mortality in a year is among those below ten years of age, whilst the corresponding figure for England is only 12%. During the first year of life India's proportional mortality is

about three and a half times that of England, at the next period it is about five times greater and between five and ten years it is more than three times as high.

Infant and child life in this country apparently suffers a proportionately higher rate of mortality than in subsequent years of life, when the populations of the two countries are compared.

Still-births.

6. Table I (*xvii*) gives the numbers of registered male and female still-births for British India and the Provinces, as also the proportions *per mille* of still to live births. The striking fact about these figures is their range of variability, from 2·9 p. m. in the case of N.-W. F. P. to 51·6 p. m. in Orissa. Registration of still-births lacks accuracy even in a country like England, where omission of live-births from registration is so uncommon as to be practically negligible. In India, with an appreciable margin of error in respect of live-births, the proportion of still-births that escapes notice must be correspondingly large. This fact is sufficient to explain the large variations noted between province and province.

TABLE I (*xvii*).

	Male.	Female.	Total.	Rate p. m. live-births.
British India	**117,860**	**93,669**	**211,529**	**21·2**
N.-W. F. P.	123	97	220	2·9
Punjab	5,695	3,932	9,627	8·8
Delhi	269	244	513	16·6
U. P.	9,430	7,168	16,598	8·8
Bihar	17,791	14,289	32,080	28·0
Orissa	7,232	5,923	13,155	51·6
Bengal	40,397	33,002	73,399	43·9
C. P.	8,735	6,511	15,246	23·4
Bombay	7,001	5,514	12,515	16·9
Sind	557	412	969	12·2
Madras	13,068	10,594	23,662	14·3
Coorg	62	43	105	26·9
Assam	5,034	3,876	8,910	37·2
Burma	2,350	1,986	4,336	10·5
Ajmer-Merwara	116	78	194	8·3

Registration and Compilation of Vital Statistics.

7. Although the defective nature of registration of the vital statistics of India has been the subject of comment in a number of previous reports, the question of their improvement is so important both from the point of view of public health administration and of epidemiological investigation that no apology is needed for referring to it once more. Existing defects in Indian vital statistics are mainly due to the following four causes. In the first place, compulsory registration has not yet been introduced all over the country, whilst the 'compulsory' areas vary in extent from province

to province. Secondly, the records are often gravely defective because of omissions in registration and carelessness in compilation. Thirdly, the existing machinery for the collection of vital statistics, particularly in rural areas, consists of illiterate village staffs, whilst the great numbers of scattered rural villages, which include about 89% of the whole population, add to the difficulties of organising an efficient system. Finally, the apathy with which even the educated sections of the community regard lapses of duty in regard to registration is reflected in a general reluctance, on the part of the local authorities, to enforce penalties for offences under the Registration Acts.

The appointment of district and municipal public health staffs in a number of provinces after the introduction of the Reforms in 1921 has resulted in a much-needed improvement in a number of areas. Since then, large numbers of unregistered births and deaths have been detected by health officers and sanitary inspectors and have been brought on to the registers. The numbers of unregistered births and deaths detected and brought on to the registers during 1936 in municipal and rural areas, have been given in the following statement in two groups (1) those where health officers are employed and (2) those where no health officer exists.

	Municipalities.		Districts.	
	Births.	Deaths.	Births.	Deaths.
With Health Officers . . .	15,881	7,109	69,361	21,735
Without Health Officers . .	3,426	1,902	13,012	7,362

The provinces of N.-W. F. P., U. P., and Ajmer-Merwara have been excluded from this statement because classified figures were not available and figures for the municipalities of the Punjab have been excluded for the same reason. It is to be noted that for British India as a whole, in nearly half the districts and in about three-quarters of the municipalities no qualified health officer is as yet employed. The large disparity evident in the above two groups of figures is striking and they provide an interesting contrast. In areas having health officers, about five times as many unregistered births were detected as in those without health officers, whether they be municipalities or rural districts. As regards deaths, a similar disproportion is obvious. It is worth noting too, that of the totals given in the statement more than 66% have been registered in Madras Presidency, where the Public Health Department for many years past has made every effort to improve the vital statistics of the province. It is clear that much remains to be done in this direction in most of the other provinces before registration can be said to be satisfactory.

For the country as a whole, the degree of error in births statistics may be taken to be at least 20 to 25% whilst in some areas the error is almost certainly higher. In the case of deaths, on the other hand, omissions are by no means so frequent and the percentage of error in mortality statistics may be taken to be represented by a much smaller figure.

In regard to registration of the cause of death the position is most unsatisfactory. Accuracy can only be obtained by providing for medical certification of all deaths. For the rural parts of the country, the expense and the difficulty of securing the necessary trained personnel alone make this an impracticable proposition. But it should not be outside the bounds of possibility in urban areas. As a matter of fact, in some of the provincial capitals, such as Calcutta, Bombay and Madras, medical registrars have been employed for some years past. The results, however, have not been

nearly so satisfactory as they might have been. For instance, an enquiry into the causes of maternal mortality in Calcutta has recently been conducted under the auspices of the Indian Research Fund Association by the Professor of Maternity and Child Welfare, All-India Institute of Hygiene and Public Health. Between June, 1936, and June, 1937, 701 recorded deaths among women were found to be due to child-birth and of these, in about 18% the cause of death was eclampsia and in 23% anaemia. On the other hand, in the Health Officer's reports for the five years 1930 to 1934 the annual recorded figures for maternal mortality ranged between 231 in 1933 and 448 in 1930 ; as regards eclampsia, with the exception of six deaths during 1932, none were recorded during the quinquennium, whilst in none of the five years was any maternal death registered as due to anaemia.

Similar defects as to cause of death have been found in the recorded figures for maternal mortality of Madras city.

A third example can be given from Madras Presidency. The recorded maternal mortality rates for the period 1921-28 ranged between 1·7 and 7·3 per 1,000 births. A special enquiry was carried out during 1927-28 in four of the largest towns, a total of 7,324 confinements being investigated. Amongst these the real maternal mortality rate was found to be 18·5 per 1,000 births. These three maternal mortality enquiries have been used as examples only ; the figures for a number of other causes of death would almost certainly reveal similar deficiencies.

There is no doubt that the medical registrars work under considerable difficulties, but if the average medical officer of health took an active interest in the vital statistics of his area, it is certain that great improvements could be effected without additional expenditure. An examination of provincial figures suggests that the degree of zeal with which the public health staffs carry out their duties in this direction varies considerably from province to province. Without assistance in the form of educated public opinion, satisfactory results may be difficult to achieve, but every member of every Public Health Department ought to realise the importance of accuracy in vital statistics records and should do all in his power to effect their improvement.

The major provinces of India, both in respect of numbers and size of territory, are as large as many of the bigger European countries. In most of these provinces, within the past 10 to 15 years, public health departments have been developed with varying degrees of success, but in a number of instances urgent need exists for the formation of a Bureau of Vital Statistics in the office of the Director of Public Health. Madras Presidency and the Punjab have already made provision for this statistical organisation ; whilst of the Indian States, Mysore and Travancore are also suitably equipped. The Public Health Commissioner, as the central co-ordinating authority, can by himself make little progress in regard to the improvement of the collection and compilation of vital statistics unless provincial and State Directors of Public Health are provided with suitable and efficient organisations for the areas under their individual control.

Statistical Public Health Studies.

8. Whilst Indian vital statistics are defective in certain respects, it can be claimed that, in respect of such diseases as cholera, smallpox and plague, the Indian villager is familiar with their manifestations, especially when they occur in epidemic form, and, even though there exists a percentage of error, the recorded figures give a fairly clear indication of the trend of events. Taken over a period of years, in fact, the figures for these epidemic diseases

are valuable from the epidemiological point of view and different workers have found it possible to submit them to statistical analyses and to draw reasonably sound deductions from them, so long as they remembered that the available figures had their limits.

Further, a large amount of material of considerable value exists in hospital records all over the country. For instance, by means of a grant from the Indian Research Fund Association, it has recently been possible to complete a study of the hospital records of cancer* which has revealed a number of new and interesting facts. The Indian Research Fund Association is also at the moment assisting a similar enquiry into the incidence of acute and chronic rheumatic infections in India. These are two examples of what is possible of accomplishment, if only individual workers would realise existing opportunities. For instance, few investigations in the field of industrial hygiene in this country have so far been carried out, whilst with expanding industrialisation, these are bound to be of increasing importance. It is surprising also that so few medical men in this country have seen fit to take up the study of statistics. Every expansion of public health activity, indeed, must inevitably call for additional trained statistical workers, for without them there can be little possibility of efficient evaluation of the results obtained from expenditure of public and private funds on health schemes.

Indian States.

9. Only a few Indian States have submitted their vital statistics and they are given below :—

TABLE I (*xviii*).

	Population.			Births.			Birth rate p. m.	Total deaths.	Death rate. p. m.
	M.	F.	Total.	M.	F.	Total.			
Suket . .	29,859	28,549	58,408	721	658	1,379	23·6	1,013	17·3
Malerkotla .	45,883	37,189	83,072	1,272	1,072	2,344	28·2	981	11·8
Kolhapur . .	476,105	453,153	929,258	18,788	17,773	36,561	39·4	24,568	26·4
Mysore . .	3,445,181	3,280,574	6,725,755	70,562	66,007	136,569	20·3	96,278	14·3

Mysore State.—Birth rates in the districts varied between 24 p. m. in Kolar and 16 p. m. in Kadur. Still-births numbered 2,059 or 15 p. m. of live-births. The birth rate in urban areas was 30 p. m. and in rural areas 19 p. m. ; the death rates were 18 p. m. and 14 p. m. respectively. The male death rate was 14 p. m. and the female rate 14 p. m. District death rates varied between 23 p. m. in Shimoga and 12·5 p. m. in Tumkur. The infantile death rate was 117 p. m. of live-births ; urban 118 p. m. and rural 116 p. m.

Rainfall.

10. Taking the year as a whole, rainfall was in slight to moderate excess in Orissa, Chota Nagpur, Bihar, the United Provinces, the southwest Punjab, east Central India, the Central Provinces and the north Madras coast, in slight to moderate defect in Sind, west Rajputana, Gujarat and the Bombay Deccan and normal elsewhere. Averaged over the plains of India, the year's total rainfall was in excess by 7%.

During January and February, rainfall was in large excess in Upper Burma, Orissa, the North-West Frontier Province, Berar, the east Central

* An account of this inquiry will be found in Section II of this report (page 89).

Provinces, Hyderabad, the Madras Deccan and the north Madras coast, and in slight to moderate excess in Lower Burma, Assam, the east United Provinces, the southwest Punjab, Baluchistan, Sind, the west Central Provinces, the Bombay Deccan, Mysore and southeast Madras ; it was normal in the east and north Punjab and east Central India, in slight to moderate defect in Bengal, Chota Nagpur, Bihar, the west United Provinces, Rajputana and Malabar, and in large defect elsewhere, no rain having fallen in the Konkan.

The total rainfall of the hot weather period March to May was in large excess in Orissa, Berar, North Hyderabad, Malabar and the north Madras coast, and in slight to moderate excess in Burma, Bengal, Chota Nagpur, the west United Provinces, east Central India, the west Central Provinces, south Hyderabad, southeast Madras and the Madras Deccan ; it was in slight defect in the east and north Punjab, the Konkan and the Bombay Deccan, and in large defect in Baluchistan, Sind, west Rajputana and Gujarat. In the remaining subdivisions the rainfall was normal.

During the monsoon season, June to September, rainfall was in large excess in the east United Provinces and in slight to moderate excess in the Bay Islands, Orissa, Chota Nagpur, Bihar, the west United Provinces, the Punjab, east Central India and the Central Provinces (excluding Berar) ; it was in slight to moderate defect in Baluchistan, Sind, Gujarat and the Deccan. Over the rest of the country the rainfall was normal.

As regards the retreating southwest monsoon period from October to December, the rainfall was normal in Upper Burma, Assam, east Rajputana, the Konkan, southeast Madras and the Madras Deccan, and in slight to moderate defect in the Bay Islands, Lower Burma, Bengal, the east United Provinces, west Rajputana, Mysore and Malabar, it was in slight to moderate excess in Orissa, Bihar, the west United Provinces, the east and north Punjab, Kashmir, the east Central Provinces and the north Madras coast and in large excess over the rest of the country.

Table I (*xix*) gives the figures of actual rainfall compared with the normal in the various provinces in each quarter of 1936.

TABLE I (*xix*).

Rainfall in inches.

	January to February.		March to May.		June to September.		October to December.		Total.	Departure from normal.
	Actual.	Normal.	Actual.	Normal.	Actual.	Normal.	Actual.	Normal.		
Mean of India	1·4	1·0	6·1	5·1	38·2	36·6	5·4	5·0	51·1	+3·3
N.-W. F. P.	4·3	2·5	3·9	4·2	7·3	8·0	1·9	1·2	17·4	+1·5
Punjab	2·0	1·9	1·6	1·9	17·4	15·3	1·1	0·8	22·1	+2·1
U. P.	1·1	1·5	1·5	1·4	50·8	33·5	1·8	1·8	55·2	+17·1
Orissa	2·8	1·4	8·7	5·7	55·8	43·5	8·0	6·7	75·3	+17·9
Bihar	0·8	1·4	3·8	3·4	51·5	41·9	4·7	3·2	60·8	+11·1
Bengal	1·0	1·3	15·5	12·5	54·2	54·3	5·1	6·0	75·8	+1·7
C. P.	2·6	1·3	2·2	1·7	47·8	40·5	5·3	2·8	57·9	+11·7
Bombay	0·2	0·2	1·2	1·5	32·7	39·7	4·6	3·4	38·7	—6·1
Madras	2·2	1·2	9·5	6·0	28·1	28·5	15·4	16·1	55·1	+3·2
Assam	3·1	2·2	27·2	25·0	63·1	66·1	7·3	7·0	100·8	+0·5
Burma	0·6	0·3	12·8	10·5	61·8	61·9	7·8	9·1	82·9	+1·1
Sind	0·4	0·3	0·1	0·5	4·1	5·2	0·5	0·3	5·1	—1·2
Rajputana	0·3	0·6	0·6	0·9	17·8	19·1	0·8	0·8	19·5	—1·8
Central India	0·5	0·8	0·9	0·9	32·7	33·1	3·4	1·6	37·5	+1·2
Hyderabad	2·2	0·5	2·9	2·0	20·9	26·5	6·6	3·7	32·7	0
Mysore	0·3	0·3	5·9	5·3	22·7	22·4	6·5	8·2	35·3	—0·8

Agricultural and Economic Conditions.

11. Table I (*xx*) gives the cultivated and uncultivated acreage in British India and different provinces during the years 1935-36 and 1936-37.

TABLE I (*xx*).

Area cultivated and uncultivated in each province.

		Cultivated.		Uncultivated.	
		Net area actually sown.	Current fallows.	Culturable waste other than fallow.	Not available for cultivation.
British India	1936-37	**231,928,430**	**48,638,377**	**154,257,801**	**155,020,999**
	1935-36	228,713,412	51,399,765	153,064,332	145,985,090
N.-W. F. P.	1936-37	**2,317,893**	**409,883**	**2,811,357**	**2,684,673**
	1935-36	2,315,034	457,246	2,785,161	2,666,205
Punjab	1936-37	**27,905,978**	**3,220,828**	**14,120,422**	**12,958,234**
	1935-36	27,462,134	3,606,988	14,232,802	12,897,757
Delhi	1936-37	**214,186**	**11,513**	**62,674**	**80,558**
	1935-36	212,751	13,451	61,971	80,321
U. P.	1936-37	**36,166,954**	**2,601,588**	**10,037,803**	**9,884,560**
	1935-36	35,906,808	2,756,405	10,157,054	9,868,845
Bihar	1936-37	**19,916,600**	**6,542,460**	**5,133,501**	**6,292,366**
	1935-36*	25,642,142	8,649,193	7,927,104	11,883,192
Orissa	1936-37	**6,486,300**	**1,695,473**	**3,613,873**	**6,172,556**
	1935-36	Separate figures not available.			
Bengal	1936-37	**24,466,300**	**4,690,883**	**5,949,866**	**9,692,231**
	1935-36	22,674,000	5,670,428	6,657,916	9,794,341
C. P.	1936-37	**24,593,915**	**3,746,418**	**13,985,674**	**4,906,582**
	1935-36	24,301,398	3,958,846	14,052,250	4,914,828
Bombay	1936-37	**28,154,019**	**5,593,158**	**877,950**	**5,683,376**
	1935-36†	33,325,994	10,340,495	6,857,693	19,140,920
Sind	1936-37	**4,754,583**	**5,104,775**	**5,738,561**	**13,706,511**
	1935-36	Separate figures not available.			
Madras	1936-37	**31,705,506**	**9,490,987**	**10,792,613**	**15,738,957**
	1935-36	31,838,922	10,243,865	11,493,106	16,926,256
Coorg	1936-37	**142,402**	**166,938**	**11,690**	**334,045**
	1935-36	140,027	169,313	11,690	334,045
Assam	1936-37	**6,613,476**	**1,345,522**	**18,756,295**	**4,577,400**
	1935-36	6,366,992	1,494,457	18,899,650	4,577,400
Burma.	1936-37	**18,165,172**	**3,802,944**	**62,071,697**	**61,468,789**
	1935-36	18,161,175	3,874,311	59,625,342	52,060 236
Ajmer-Merwara.	1936-37	**325,146**	**215,007**	**293,825**	**840,161**
	1935-36	366,035	164,767	392,593	840,744

* Figures for Bihar and Orissa.

† Figures for Bombay Presidency including Sind.

As regards areas actually sown, there has been an increase during the present year in every province except Ajmer-Merwara. The slight fall in the case of Madras Presidency might have been due to the transference of territory to Orissa.

Table I (*xxi*) gives the areas in acres under food crops in British India and the provinces.

TABLE I (*xxi*).

Provinces.	Areas under food grains. Acres.	Areas under other food crops. Acres.	Total areas under food crops. Acres.
British India	**204,035,931**	**12,652,626**	**216,688,557**
N.-W. F. P. . . .	2,283,121	140,885	2,424,006
Punjab	22,383,675	1,078,128	23,461,803
Delhi	224,561	12,349	236,910
U. P.	38,122,069	3,359,457	41,481,526
Bihar	20,199,800	2,017,400	22,217,200
Orissa	6,177,120	264,818	6,441,938
Bengal	23,724,800	1,622,400	25,347,200
C. P.	20,327,125	293,388	20,620,513
Bombay	19,945,040	487,357	20,432,397
Sind	3,966,536	58,460	4,024,996
Madras	25,923,378	1,552,348	27,475,726
Coorg	89,784	12,608	102,392
Assam	5,683,774	503,113	6,186,887
Burma	14,689,718	1,232,728	15,922,446
Ajmer-Merwara . . .	295,430	17,187	312,617

A comparison for these figures with those for 1935 shows that increases were recorded in every province.

For detailed information regarding agricultural conditions the provincial Season and Crops Reports should be consulted.

Famine relief.

12. (*i*) *Bengal.*—A state of scarcity existed during 1935-36 in parts of the districts of Birbhum, Burdwan, Bankura and Murshidabad, and because of failure of rains in the following year the condition of both men and cattle in these districts became worse. General distress existed throughout the Hooghly district and similar conditions were also reported in parts of 24-Parganas, Nadia and Khulna districts. Floods were responsible for some damage to standing crops in parts of Western Bengal and agricultural and land improvement loans were provided as a measure of relief. Test works had to be opened or reopened on a large scale in the districts of Burdwan, Birbhum, Bankura, Murshidabad and Hooghly. Expenditure on relief operations in 1936-37 included : (1) Government Agricultural and Land Improvement Loans Rs. 7,14,000 ; (2) Government Test Relief Rs. 1,54,000 ; (3) Government Gratuitous Relief Rs. 22,000 ; and (4) I. P. F. Trust Fund Relief Rs. 50,000.

(*ii*) *Assam.*—Local distress, caused in Sylhet by the short crop of 1936 and in several other districts by the early 1937 floods, was relieved by the

grant of loans and by gratuitous relief on a small scale. Hailstorms did considerable damage in a few villages in the Mokokchung subdivision of the Naga Hills and in the Jowai subdivision of the Khasi and Jaintia Hills to relieve which the Government of Assam sanctioned Rs. 3,000 for agricultural loans and Rs. 5,000 for seed loans, besides remitting land revenue to the extent of Rs. 3,130. In some parts of Kamrup, insect pests were reported to have been in evidence. To relieve the damage caused by a cyclone in the Sibsagar district, the Provincial Government sanctioned a sum of Rs. 400 for gratuitous relief and remitted land revenue amounting to Rs. 3,000.

(*iii*) *Bombay.*—Scarcity was declared to exist in Ahmednagar district and parts of the Panch Mahals, Poona, Sholapur and Bijapur districts. To meet the situation *tagai* grants were sanctioned by the Bombay Government on a liberal scale and extensive relief works were opened. Measures taken to relieve lack of fodder included the waiving of grazing fees, the opening to free grazing of certain forest areas, the organised import of grass and its transport and sale at concession rates, reduction in the rate of interest on *tagai* loans for fodder and the charging of a reduced rate per acre for monsoon water for fodder crops in the irrigated tracts of the Deccan and Gujarat. The expenditure on scarcity relief up to the end of December, 1936, included : (1) *Tagai* advances Rs. 10,07,000 ; (2) Relief works Rs. 7,17,000 ; (3) Gratuitous relief and dôles Rs. 3,13,580 ; (4) Improvement of water supply Rs. 22,000 ; (5) Fodder supply Rs. 50,000.

Other measures taken by the Provincial Government to relieve distress were land revenue remissions amounting to Rs. 7,52,700 to compensate for the fall in agricultural prices. In addition, suspensions and remissions of land revenue sanctioned under the ordinary rules amounted to Rs. 56,28,000 and Rs. 10,69,200 respectively. Later on, a substantial part of the suspensions was converted into remissions.

(*iv*) *Ajmer-Merwara.*—During the year under report there was scarcity of fodder in almost all parts of the Ajmer-Merwara district. Relief measures to meet the situation included (1) the opening of forest reserves for grazing ; (2) *taccavi* loans ; (3) importation of fodder at concession rates ; (4) remission of land revenue ; and (5) the opening of public works.

(*v*) *Burma.*—In May, 1936, serious damage, with the loss of about a thousand lives, was caused by a cyclone in Arakan. A grant of Rs. 50,000 was made by the I. P. F. Trust to the Government of Burma for the relief of distress, but of this sum only Rs. 25,000 was actually drawn by the Burma Government during the year.

(*vi*) Floods caused damage to standing crops and property in low-lying tracts of Western, Eastern and Rohilkhand districts of the United Provinces, Madras, Sind, Punjab, Bihar and N.-W. F. P. The U. P. floods were the most serious and caused considerable distress and damage over a wide area, including over 7,000 villages. Distress became more acute when the floods reappeared before the crops could recover ; in some areas flooding occurred on three or more occasions. To assist the re-establishment of impoverished agriculturists and others, a grant of Rs. 25,000 was sanctioned from the funds of the I. P. F. Trust. For immediate needs the U. P. Government sanctioned Rs. 2 lakhs for *takavi* advances and Rs. 34,000 for gratuitous relief, but these sums do not represent the entire extent of the relief afforded by the Provincial Government. In Bihar, the Provincial Government sanctioned considerable sums as *takavi* advances and Rs. 23,500 was allotted for gratuitous relief. In addition a grant of Rs. 15,000 was made from the I. P. F. Trust.

SECTION II.

HISTORY OF THE CHIEF DISEASES.

Introduction.

13. Within the last few decades public health endeavour has increasingly been concerned not only with prevention of disease but also with more positive contributions to the welfare of the individual by providing continuous supervision of his health throughout life. In India, however, prevention of disease still remains the most important function of her health organizations and in this chapter an attempt has been made to review the main causes of morbidity and mortality affecting her population. Classified in the broadest sense, diseases may be divided into two groups, (1) those associated with the invasion of the human body by pathogenic organisms and (2) those which result from a derangement of the normal metabolism of the body through causes other than parasitic invasion. In the first group fall all the infectious diseases and in the second, those such as cancer and diabetes. It is commonly acknowledged that the most notable triumphs of preventive medicine have been achieved in respect of the former.

Infectious diseases have exhibited at all times a tendency to wax and wane. Periods of high incidence are followed by those of comparative quiescence and these, in their turn, again give place to increased prevalence. The principal factors concerned in the production of epidemics are (1) man, (2) the infective agent and (3) the mode of transmission which renders possible the entry of the infective agent into man. The resistance of the individual, the virulence of the organism and the factors affecting transmission all play their part in determining the nature and extent of epidemic disease. So little is known of the conditions under which pathogenic organisms undergo enhancement or attenuation of virulence that practical preventive measures are mainly confined to (1) increasing the power of resistance of the population and (2) guarding the population from exposure to infection.

Immunity may be either natural or acquired. Our knowledge in respect of the genetic factors in relation to natural immunity is so scanty that the breeding of a race endowed with natural powers of resistance to disease is not yet within the region of practical adoption, even were it not the case that social and economic considerations prohibit any such experiment. On the other hand, the production of artificial immunity is now one of the chief weapons that the science of bacteriology has placed in our hands in the continuous campaign against disease.

As regards protection of the community from exposure to infection, this includes all those measures which may collectively be labelled as environmental hygiene. In addition, the dissemination of epidemiological intelligence, the development of quarantine measures and the education of the individual so that he will play an intelligent part in the campaign against disease, all come into the scheme. It must be remembered that these fundamental sanitary requirements are the strongest line of defence for the community and are much more effective than those concerned with artificial protection. The experimental epidemiological studies by Topley, Greenwood and their co-workers have demonstrated that, in an infected herd of mice previously immunised to an extent impossible in any human population, the addition

of non-infected, non-immune mice suffices to produce inexplicable recrudescences of disease in the herd even after long intervals of freedom from infection. Whilst it may be argued that results obtained by animal experimentation are not capable of direct application to human beings, it still seems permissible to infer that immunisation, however efficiently carried out, cannot bestow complete protection on any given community. The sheet anchor of human safety therefore appears to be the development of those essential conditions for a healthy life which improvement of the environment implies.

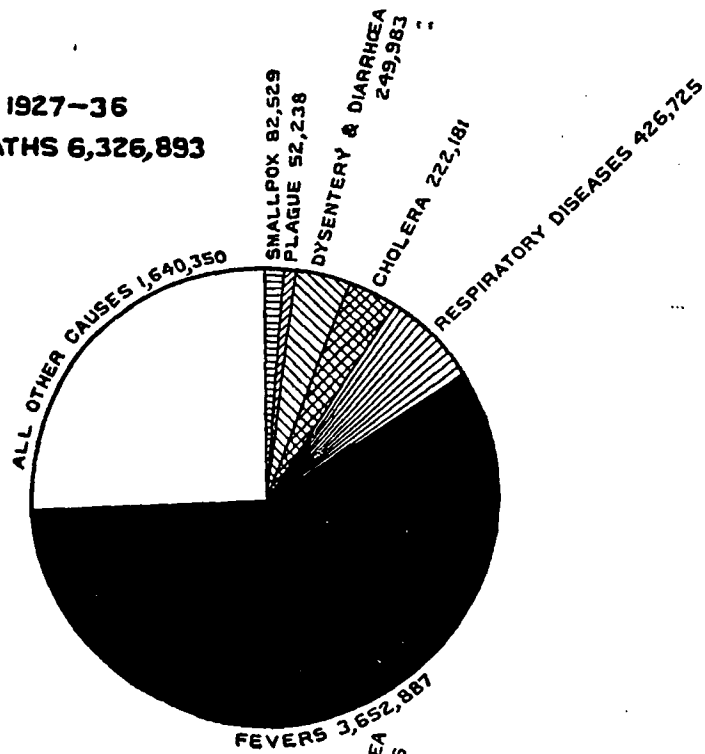
It must be remembered, however, that, from the point of view of epidemic control, communal and individual immunity may have different meanings. This is well illustrated by the history of plague in England. When plague was introduced into that country in 1348 it wrought terrible havoc and repeated outbreaks of great violence periodically occurred until the disease disappeared after a final outburst in 1666. Then followed a period of about two hundred and forty years after which the infection reappeared though with very different results. Between 1906 and 1918, a small area of East Anglia, showed evidence of a fairly widespread and continued infection of plague among the rat population. During these twelve years, however, about 20 cases of human plague were recorded, whilst those cases were distributed in groups of four or five at intervals varying from about nine months to seven years. From the point of view of the individual, since plague had not existed in England, for well over two centuries, it is certain that the population living in the infected locality must have been highly susceptible. The fact that in spite of the continued presence of infection among rats no widespread human outbreak occurred indicates that the conditions necessary for the dissemination of infection from rat to man were almost completely absent. Herd immunity was high; personal immunity was not. During the interval of two and a half centuries, changes in the mode of life of the people had apparently been such as to eliminate almost entirely the opportunities for any close association between rat and man.

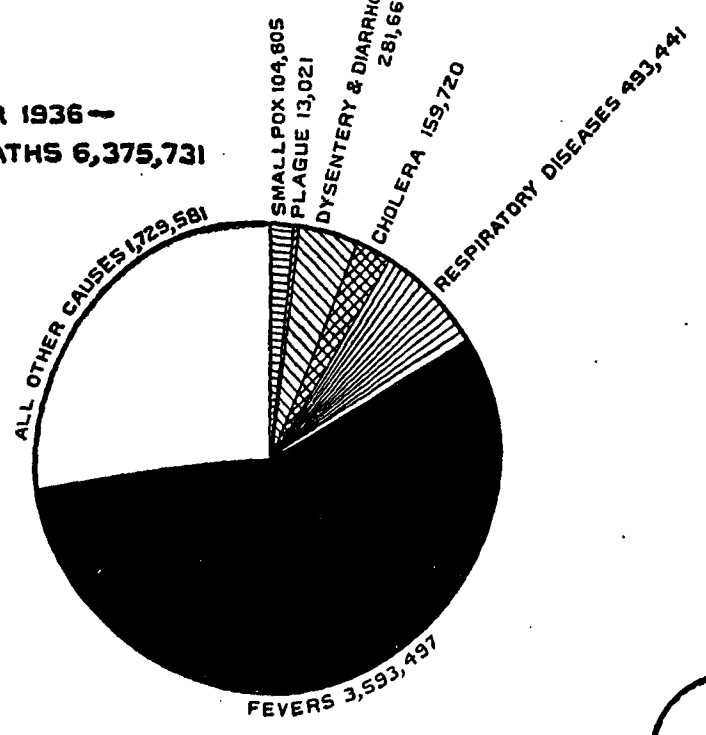
From the point of view of the community, therefore, it is necessary to concentrate on introducing those permanent changes which will make it possible for the people to lead healthy lives. Whilst vaccines and sera, drugs and other treatments all have their place in the fight against disease, they are no substitutes for sanitary dwellings, fresh air, pure water and abundant and wholesome food. These are the foundations on which alone the superstructure of individual and communal health can be built.

These remarks have a direct bearing on the programmes of public health endeavour in this country. The Government of India Acts of 1919 and 1935 have transferred to the people of the provinces the power to control their own destiny. Public health, in any case, is a provincial subject and there can be no doubt that abundant opportunities exist for a marked advance in the field of environmental hygiene. Expenditure devoted to its improvement is a sound form of insurance against the havoc wrought by disease and a wise provision for increased health and happiness of the people.

Another matter which demands greater attention is improvement of the public health administration now placed in the hands of local bodies. Few would deny that the general level of their health administration is lamentably low in respect even of the primary necessities of community life and, in one way or another, pressure must be brought to bear on all local bodies who neglect

Nº 3
BRITISH INDIA
COMPARATIVE DIAGRAMS OF DEATHS BY CAUSES





their responsibilities in these directions. Co-ordination of the efforts of individual authorities is equally necessary if satisfactory results are to be obtained, but, as conditions vary widely in the various provinces, the action taken by individual provincial governments will almost of necessity be on different lines. In some provinces, the health personnel are servants of the local bodies, whilst in others, although subordinate staffs are appointed by the local authority, the medical officers of health are members of a provincial service recruited and maintained by Government. In spite of these differences it should be possible to devise methods for the proper supervision and co-ordination of the public health work of local bodies. In the first place, it is essential that health services should be provided for every rural and urban area. Secondly, whilst it is eminently desirable that the existing provisions of law for health administration, which at present are to be found in different enactments, should be consolidated and extended in a single Provincial Public Health Act, it is to be noted that existing Local Self-Government Acts already give provincial governments considerable powers of supervision and control over local bodies. By one method or the other, steps should be taken to regulate the conditions of recruitment and service of the health staffs employed by local authorities, to secure adequate opportunities for supervision and control by the provincial governments through their technical advisers, the Directors of Public Health, and to promote co-ordination of effort between different authorities. It ought to be clearly laid down that every local authority is required to maintain a health staff and equipment sufficient to deal at least with day to day routine work, and that, when emergencies such as epidemic outbreaks arise, the resources of the local bodies will be supplemented from the provincial health organisations.

Cholera.

14. During 1932, the incidence of cholera in British India was the lowest recorded for over 60 years, the mortality rate being only 0·2 p.m., but in the three subsequent years the figures rose steadily, the recorded mortality rates for 1933, 1934 and 1935 being 0·3 p. m., 0·7 p. m. and 0·8 p. m. respectively. In the report for 1935, it was stated that the peak incidence had probably been reached ; in fact, during 1936, an appreciable decrease in incidence occurred. Total deaths from cholera numbered approximately 160,000, a figure 57,442 less than that of 1935, and giving a mortality rate of 0·6 p. m. The decreased incidence was common to most provinces, the most important exception being Bengal.

Provincial cholera mortality rates for 1936 are set out in table A, Appendix II. Bengal with a mortality rate of 1·5 p. m. and Orissa with a rate of 1·1 p. m. were worst affected. At the other end of the scale were Coorg and Sind with only 2 and 8 deaths during the year. The N.-W. F. P., the Punjab and Delhi Province also recorded low incidences, the rates being 0·03, 0·06 and 0·07 p. m. respectively. In other areas, the rates varied between 0·1 and 0·7 p. m.

In Bengal, cholera deaths during 1936 were 25 per cent. higher than in the previous year, the figures being 76,100 and 59,605 respectively, whilst, in comparison with the quinquennial average, the increase was one of nearly 50 per cent. Of 712 registration circles, 646 or nearly 90 per cent. reported cholera deaths and of 86,361 villages 15,998 or nearly 19 per cent. were infected. The seasonal incidence of cholera in Bengal continues to present interesting features. For the province as a whole the incidence is at its minimum during the monsoon months. The curve begins to rise in October-November, continues its upward trend in December and January and, after a slight decline in February, steadily

rises till the peak is reached in April-May. Although this description holds good for a large part of Bengal, a more detailed examination, however, demonstrates that conditions differ in different parts of the province. As the western borders of Bengal are reached, a curious variation is to be observed. Examination of individual *thana* figures in this region shows that the disease tends to prevail during the monsoon months though to a relatively lesser degree, whilst this feature is not to be found in any other part of the province. It is probable that this region marks a transitional stage between the typical seasonal periodicity of Bengal and that prevailing in the provinces lying to the north-west. Further comment on this point will be made in a later paragraph.

Compared with 1935, 14 districts recorded lower cholera death rates, in two districts the rates were the same, whilst in the remaining ten the rates were higher. The rural death rate was 1·6 and the urban 1·1 p. m. Thirty-four towns recorded rates higher than the general urban rate, the highest figure being 3·8 p.m., whilst in 16 towns the rates were above 2 p. m.

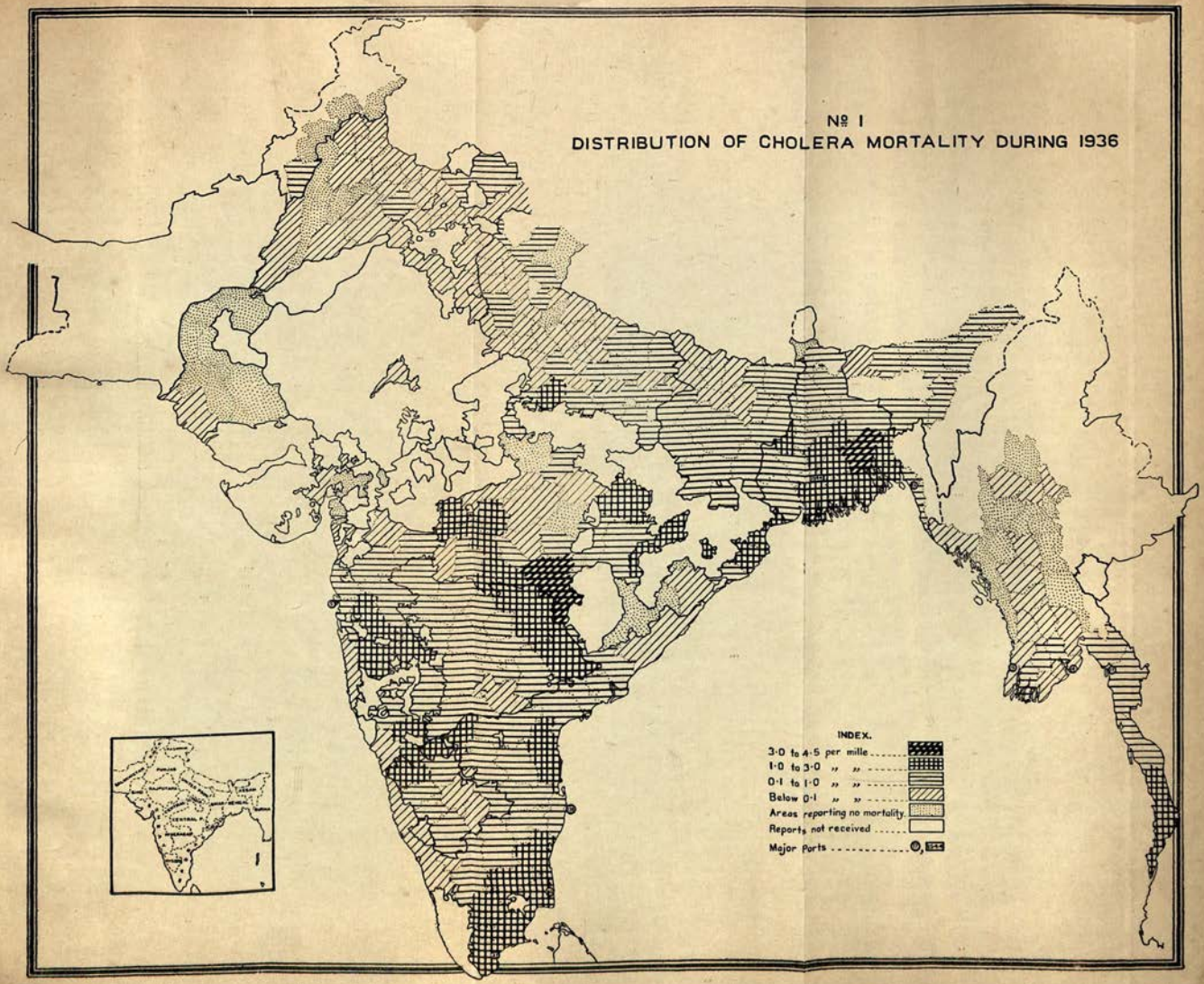
In Bihar, a remarkable reduction in cholera mortality occurred during the year, total deaths falling from 57,136 in 1935 to 6,070 in 1936. In the districts of South Bihar the disease began in the late summer and continued until the winter months, but in North Bihar, it appeared earlier in the hot season and died out by the end of the south-west monsoon. The D. P. H. reported that examination of the figures for 1929—1936 has indicated that in both areas the incidence of cholera reaches a maximum at intervals of five or six years and that the peak incidence occurs in consecutive years in North and South Bihar. During 1936, some of the districts of South Bihar were severely affected.

In this province, public health organisations have not yet been provided in every district. Ten district boards had health officers with suitable subordinate staffs, and these carried out preventive measures along with their other public health duties. Additional epidemic medical officers were supplied by the Public Health Department to districts which had no qualified health officers of their own, as well as to others where the local health staffs were unable to cope with serious outbreaks.

In Orissa, cholera was prevalent almost throughout the year, reaching its maximum intensity during April to August. Deaths numbered 7,977, the three districts of Cuttack, Balasore and Sambalpore reporting as much as 92 per cent. of the total. Only four districts had their own public health organisations; in others, temporary epidomic medical officers were sent by the Public Health Department to assist in combating outbreaks. During the Rathjatra and Snan festivals at Puri, which were held in June and were attended by large numbers of pilgrims from all parts of India, only 24 cases of cholera occurred, although the town and district was sporadically infected at that time. As the D. P. H. has stated, this would appear to be a striking testimony to the value of a protected water supply, of anti-cholera inoculation and of the other sustained efforts made to control the disease.

In Assam, cholera mortality was only about half that of 1935, the figures being 3,816 and 7,436 respectively. Out of a total of 28,333 villages, only about 5 per cent. were affected, although it is to be noted that the infected villages were distributed over about 70 per cent. of the 143 registration circles in the province.

In the United Provinces, cholera deaths totalled 6,793 as compared with 10,412 during the previous year, the death rates being 0·14 p.m. and 0·21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DISTRIBUTION OF CHOLERA MORTALITY DURING 1936
INDEX.
3·0 to 4·5 per mille
1·0 to 3·0 „ „
0·1 to 1·0 „ „
Below 0·1 „ „
Areas reporting no mortality
Reports not received
Major Ports

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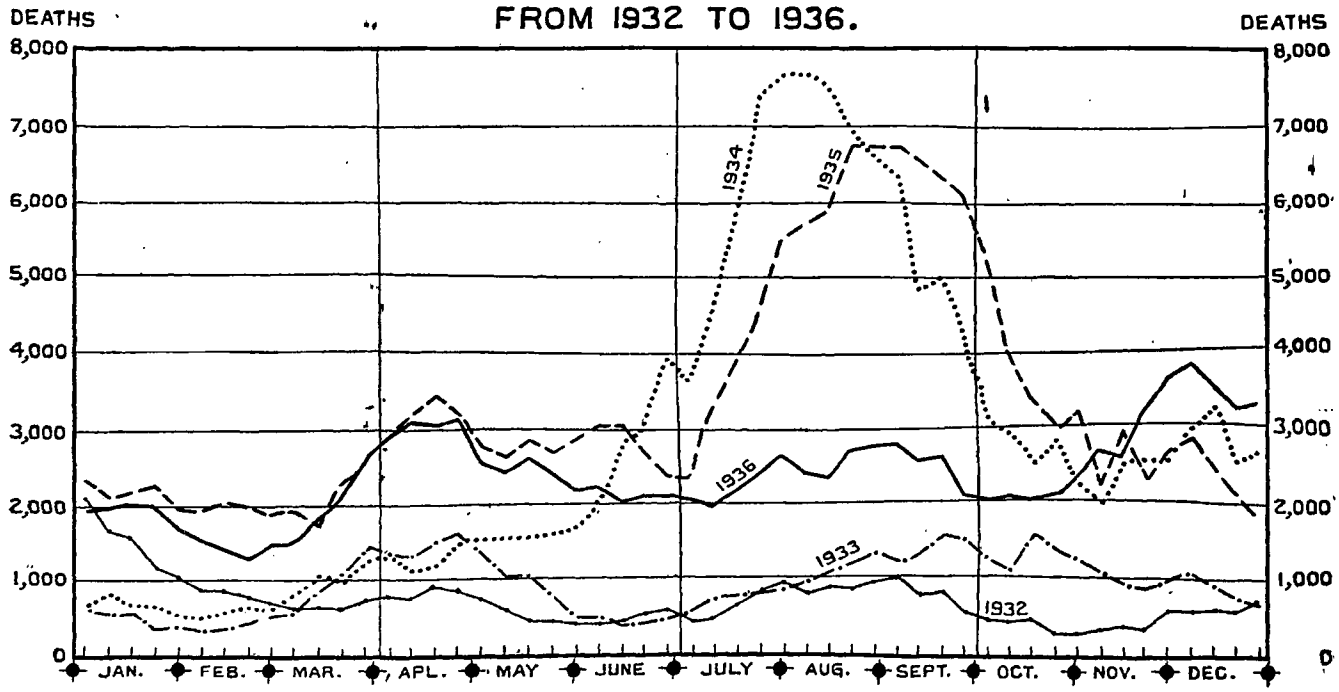
WEEKLY NUMBER OF DEATHS FROM CHOLERA IN INDIA FROM 1932 TO 1936.



Note-Reproduced from the League's Weekly Epidemiological Record for November 5th. 1937 R.H. 610.

p. m. respectively and the quinquennial average rate being 0·35 p. m. The disease reached its maximum intensity in June and fell to a minimum in January. In 14 districts out of a total of 48, the death rate exceeded the provincial rate; the rural and urban rates were 0·14 and 0·15 p. m. respectively. In order to prevent the spread of cholera from Nepal State, the so-called "barrier scheme" was again in operation, a special staff being posted at the border of Nepal in Gorakhpur and Basti districts. Cases of cholera arriving from the State were promptly treated at the barrier and all wells in the area were kept thoroughly disinfected. As an anti-cholera measure, every district was supplied with permanganate of potash and kaolin on a scale prescribed by Government. Grants amounting to Rs. 9,937 were given to district magistrates for anti-cholera measures in rural areas. Temporary regulations under the Epidemic Diseases Act were enforced in a number of districts and municipalities.

In the Punjab, cholera was widespread in its distribution, 26 out of 29 districts being affected and total deaths numbered 1,721 as compared with 714 during the previous year. Apart from minor outbreaks during the first quarter, the main epidemic began in May when infection was introduced from Hardwar by pilgrims returning to Kangra and Lahore districts. After the infection had established itself in these two areas, it spread extensively from village to village. The Epidemic Diseases Act was brought into operation in Lahore district on 10th June but by that time about 250 cases had occurred and 13 localities had become infected. As might have been expected, the application of measures under this Act at a late stage of infection failed to produce the desired effect and in future it is to be hoped that the special powers conferred by this enactment will be promptly used, as soon as it is evident that the disease is likely to gain a foothold. In the Punjab, cholera infection is commonly introduced by pilgrims returning from Hardwar and other places of pilgrimage in the United Provinces. The Director of Public Health has emphasised the importance of perfecting a system of notification of cases and contacts, a more rigid system of "follow up" and the routine establishment of inspection posts at key positions on the railways.

In the N.-W. F. P., two cholera epidemics occurred during the year, the first in January and February and the second in November and December. Total deaths numbered 68 as compared with 245 in 1935. The second outbreak was due to importation of infection from Afghanistan.

Cholera mortality in Bombay Presidency was much the same as in the two previous years, the figures being 11,361 in 1934, 11,191 in 1935 and 11,304 in 1936. Rural areas were much more affected than urban, the respective rates being 0·74 p. m. and 0·16 p. m. The peak incidence occurred from August to November, the largest number of deaths being recorded in October.

A point to which the D. P. H. has drawn attention was the persistence of infection in certain districts of the Deccan.

"In the past cholera used to spread in epidemic waves and the invaded territory used to be free for the rest of the year after the epidemic had subsided. In 1933, cholera was present almost throughout the year in Ahmednagar, Poona, Nasik, Sholapur and Satara districts. It lingered in 1934 throughout the year in Ahmednagar and Nasik districts; in Poona, Thana and Satara districts it was absent only for one month. In 1935, it prevailed throughout the year in Bijapur and Sholapur districts and almost throughout the year in Belgaum and Satara. In 1936 it was again prevalent throughout the year in Satara district but the other districts were free for a comparatively longer period. The question whether cholera is showing a tendency to become endemic in certain areas which hitherto were not recognized as endemic foci is one which seems to demand consideration."

In the Central Provinces, cholera deaths were only about half those recorded during 1935. Infection is reported to have been introduced into different parts of the province from Puri, an important pilgrimage centre in Orissa; from Allahabad during the Kumbh Mela; and from a fair in the Nizam's Dominions. Preventive measures included the enforcement of temporary regulations under the Epidemic Diseases Act, the concentration of as many of the public health and medical staffs as could be diverted from other duties and the establishment of ten temporary epidemic dispensaries.

In Madras Presidency, although the total cholera deaths were slightly less than in 1935, the disease was widespread and more or less evenly distributed throughout the year. In the Southern and Central districts, the usual winter epidemic associated with the north-east monsoon was in full swing before the beginning of the year; in addition, a sharp outbreak occurred during January in the more northern districts of Kistna, Guntur and West Godavari amongst labourers moving from village to village during the harvest season. By the end of March a general decline in incidence was recorded but a further recrudescence occurred in the southern districts during the second quarter of the year. As a result of importation of infection from Pandharpur festival in Bombay Presidency in June, an extensive summer epidemic was experienced during the months of July, August and September mainly in the central parts of the province and the year closed with the customary autumn and winter epidemic in severe form, an important festival in North Arcot district contributing largely to a dissemination of infection over the surrounding districts. The D. P. H. reported that, in spite of widespread epidemics, "the ravages caused by the disease were much less than in the past on account of the more vigorous and better organised control measures."

During 1936, Burma recorded a much lower incidence of the disease, total deaths being only 984 as against 6,858 in 1935. The rural rate was 0·08 p. m. and the urban 0·06 p. m.

These descriptions of provincial cholera epidemics during 1936 will have made it clear that India, unfortunately, continues to live up to its evil reputation of being *the* important world reservoir of cholera infection. Moreover, although public health departments for years past have carried on vigorous campaigns against the disease, it is obvious that the results achieved have not so far been commensurate with the energy and time spent in that direction. The reasons for this comparative failure to effect satisfactory control of cholera are not far to seek. In the first place, large areas of the country do not yet possess any local public health staffs. Secondly, even where health staffs exist, their personnel is often numerically inadequate to cope with the large populations entrusted to their care, widely scattered as the people are in numbers of small villages. Further, without safe water supplies and efficient systems of conservancy, it is almost impossible to make appreciable progress in the effective control of the spread of infection in rural areas. In spite of these handicaps, however, provincial health staffs have generally done good work, particularly within recent years in the sanitary control of the numerous fairs and religious festivals which are held all over the country. Whilst previously it was all too common for explosive outbreaks of cholera to occur at these centres and to be followed by widespread infection, the elaborate precautionary measures now generally in force have been largely effective in preventing dissemination of the disease from these dangerous foci.

The epidemiology of cholera still presents many puzzling features. As long ago as 1874, Bryden was able to show how cholera, originating in its

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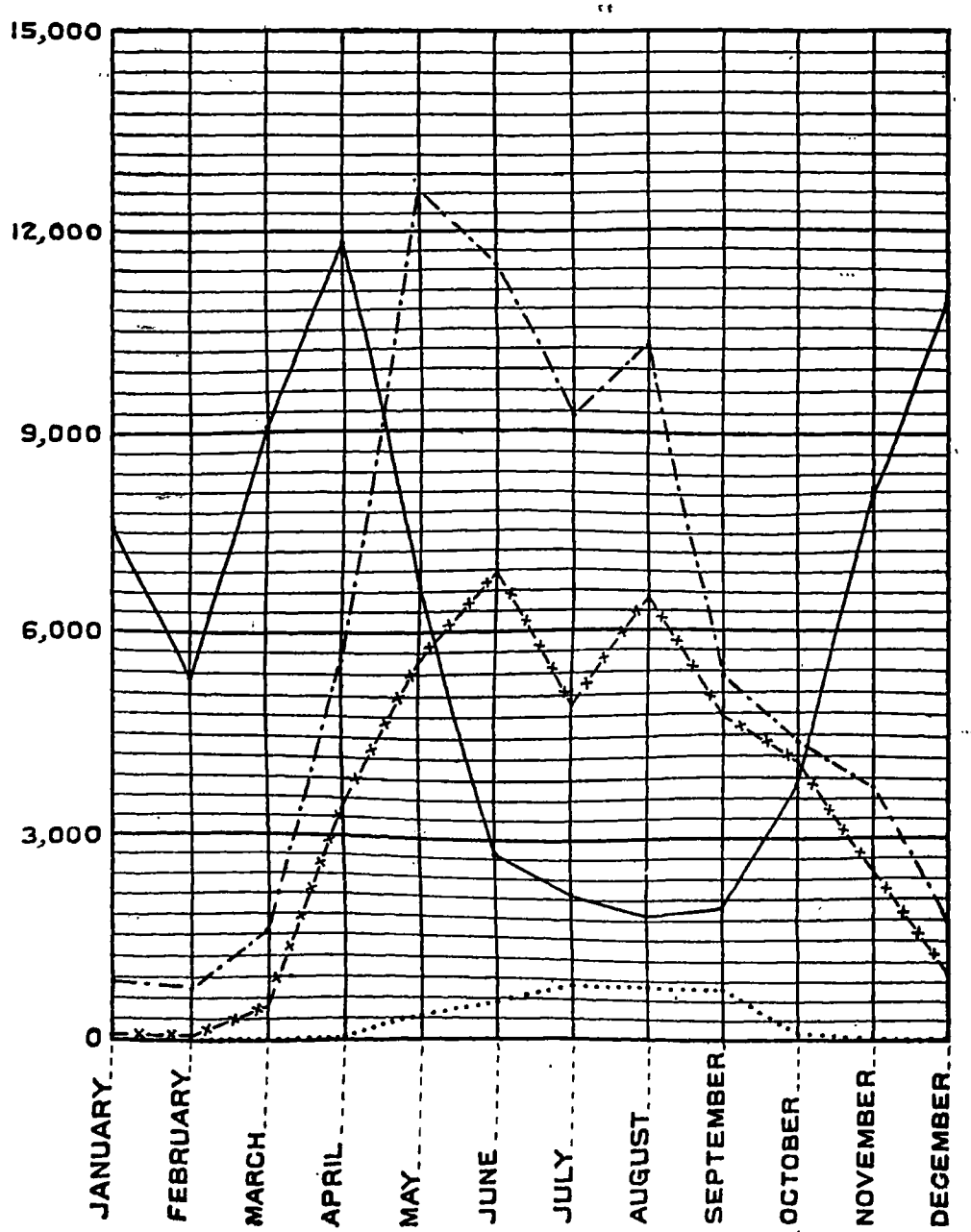
MEAN MONTHLY CHOLERA MORTALITY IN THE PROVINCES OF BENGAL, BIHAR AND ORISSA, UNITED PROVINCES AND THE PUNJAB DURING THE PERIOD 1912–1935.



REFERENCES.

BENGAL ———

BIHAR AND ORISSA —·—·—

UNITED PROVINCES —×—×—

PUNJAB .....

endemic home in Lower Bengal, periodically swept across India by two main routes, "the northern epidemic highway up the Ganges valley to Afghanistan and Persia and the southern epidemic highway across the Central Provinces to Bombay, Madras and Ceylon". It is interesting to note that, although present day facilities for rapid transport might have been expected to speed up the spread of the disease, in actual fact, no such acceleration in the dispersal of infection appears to have occurred. This phenomenon presents a field for speculation but, as Rogers has pointed out, the fact remains that "to the present day the regular sequence of events in Northern India is for cholera to become very prevalent in Eastern Bengal in November and December, in Bihar and the eastern sub-Himalayas divisions of the United Provinces in March, the Southern and Western United Provinces in April and the Punjab not until May, in spite of railway communications uniting the extremes of this immense area in three days."

The varying seasonal incidence of cholera in different parts of India is another well-recognised feature of the disease, as it exists in this country. The graph facing this page which gives the mean monthly cholera mortality figures for the period 1912—1935 in the provinces of Bengal, Bihar and Orissa, the United Provinces and the Punjab indicate how variable these incidences are in different areas. In Bengal, the peak of the cholera curve is reached between March and April, in Bihar and Orissa in May, in the United Provinces about June and in the Punjab in August. In contrast with Bengal, where the minimum incidence of cholera synchronises with the south-west monsoon, in the other three provinces the peak incidence of the disease occurs regularly during the monsoon period. Rapid transport of man has apparently had no effect on the periodicity of the disease in those areas. At the same time, the seasonal variations to be seen as one passes from Bengal to the north-west of India still lend support to Bryden's hypothesis of a northern epidemic highway along which infection travels with regularity, even although the present day possibility of accelerated spread weighs against the acceptance of such a theory. Rogers has suggested that a rise of absolute humidity above 0·4 mm. is essential for the development of epidemic cholera and that this is the important factor responsible for the seasonal distributions exhibited in the different provinces. The influence of seasonal or climatic factors on the incidence of cholera was made the subject of intensive study some years ago by Russell and Sundararajan who made the definite claim that "it is no longer theory to suppose that climatic factors have a definite relationship with the incidence of cholera in India". In their opinion, a high relative humidity with high temperature, accompanied by intermittent rains, formed the most favourable atmosphere for development of the disease. Although the monsoon season with its relatively high temperature and high humidity corresponds with the period of maximum incidence in the provinces of Northern India they concluded that no single factor could be held responsible for the periodic waves of cholera that devastated the country. "Individual susceptibility, foci of infection, favourable atmospheric conditions, fairs and festivals, carriers, insanitary habits, all play their part in a manner which defies analysis". In view of the new knowledge now available in respect of the *V. cholerae* it seems possible that further light on the problem would be obtained if a fresh epidemiological investigation were now taken in hand. Whilst Koch's discovery of the cholera vibrio and recognition of the role played by carriers in the initiation and spread of cholera threw considerable light on the mechanism of the production of epidemics and pointed the way to their control, many points in regard to the epidemiology of the disease still require elucidation, points whose investigation are of importance

not only to India but to the outside world. Ever since Greig in 1913 ascribed a jail epidemic to a healthy cholera carrier, a number of countries in close communication with India have viewed with grave apprehension the possible carriage of infection into their territories by means of such carriers. In 1931, during an epidemic of cholera in Iraq, travellers from Iraq to Syria and Egypt found to be carrying agglutinating vibrios were subjected to quarantine measures, although they came from areas where cholera had not occurred for a long time. The question how far such individuals could be considered to be potential sources of danger was referred to the Permanent Committee of the Office International d'Hygiene Publique. After careful consideration, that committee expressed the opinion that the fundamental problem of vibrio characters under conditions of endemic and epidemic prevalence of cholera required investigation and recommended that, in view of the exceptional facilities available in India, the Government of India should be requested to take up the study of the problem. To that request the Government of India willingly acceded and, during the past four years, co-ordinated studies on different aspects of the subject have been in progress, the whole of these researches being financed by the Indian Research Fund Association. The work which is being carried on in different laboratories, is co-ordinated by a Cholera Advisory Committee, of which the Director of the Central Research Institute at Kasauli is the Chairman. Substantial advances in our knowledge have been made in more than one direction and the interim reports, which have been presented to the Office International, have received warm appreciation both at the hands of the Cholera Commission and of the Permanent Committee. The Cholera Commission at its meeting in May, 1937, was pleased to note "that these researches have thrown considerable light on the problems raised by it in 1934, *viz.*, on the epidemiology of cholera, on the significance of healthy carriers of vibrios and on the preparation of a specific standard agglutinating serum for the diagnosis of the 'classical' cholera vibrios". The following note, kindly prepared by the Chairman of the Cholera Advisory Committee of the Indian Research Fund Association, gives a brief summary of the findings :—

"In general, the main line of work which is being followed out at present is an investigation into the characters of the vibrios obtained from cases of clinical cholera, from carriers and from natural water in relation to their source of origin and the epidemiological circumstances of isolation. It is considered necessary to investigate these points by modern methods in order to obtain a more exact basis for further studies on the factors concerned in endemicity and spread of cholera."

"The main source of the material for this work has been Bengal, where cholera case material is readily available in the Campbell Hospital, Calcutta, and where a field investigation into carrier and water conditions has been instituted in the Diamond Harbour area in the vicinity of Calcutta. This latter field enquiry has also afforded opportunities for epidemiological studies. The vibrios obtained from these sources have been studied in regard to their chemical structure by the enquiry at the All-India Institute of Hygiene and Public Health, Calcutta, at the Calcutta School of Tropical Medicine in regard to their general bacteriological characters, their biochemical reactions and their phage lysability, and by the Director of the Central Research Institute in regard to their special serological classification."

"In addition to these studies made on vibrios mainly derived from Bengal, parallel investigations have been made on Assam strains by an enquiry under the Director, Pasteur Institute, Shillong, and on Madras strains by an enquiry under the Director, King Institute, Madras."

"All associated inquiries have adopted the same fixed serological basis for their work and have used for the diagnosis of typical *V. cholerae* sera prepared by the use of the dried 'O' antigens of the Inaba and Ogawa sub-types issued from the Standards Laboratory, Oxford. These antigens had been prepared by Mr. Bruce White and submitted to tests

by Dr. A. D. Gardner at Oxford in the Laboratories of the Medical Research Council and it had been arranged that field trials of the antigens should be carried out by the research workers in India. The use of the antigens by all associated enquiries has made it possible to obtain information on a large scale as to the value of the antigens for the diagnosis of typical *V. cholerae*. A report on the results has been submitted for consideration by the Medical Research Council and it is shown that the separate determination of 'O' agglutination is essential in diagnosis and that the use of the older type of 'H+O' sera is fallacious."

"The following is a brief resume* of the work of the individual enquiries :—

"*Enquiry into the vibrios under the Director, Central Research Institute, Kasuali.*—This enquiry undertook the supervision of the trials of the dried 'O' antigens and consolidated the reports for submission to the Standards Laboratory, Oxford. The results of the tests confirmed the necessity for separate determination of 'O' agglutinations and showed that the use of H+O sera was fallacious in the diagnosis of *V. cholerae*."

"The serological characters of 558 vibrio strains from cases of clinical cholera, 'carriers' and water mostly from Bengal were studied by means of 31 special 'O' sera and a grouping was obtained of about half of the strains. All groups were very small and all groups were represented by strains from two or more of the sources. Vibrios of any one serological type, other than 'O group I', were not derived from cases of cholera geographically or chronologically related. These findings are considered to show that outbreaks of cholera are not due to vibrios of serological type other than the classical one."

"*Cholera Bacteriological Enquiry at the School of Tropical Medicine, Calcutta.*—An intensive bacteriological study was made of the cholera cases in the Campbell Hospital especially in regard to those from whom only inagglutinable vibrios were isolated. The characters of such vibrios including their phage reactions were obtained and also the serological changes in the patients. The bacteriological work for the Carrier Enquiry, involving the daily examination of 200 stools, was conducted in addition and the strains collected formed the basis of combined studies."

"*Enquiry into the Chemical structure of the Vibrios at the All-India Institute of Hygiene and Public Health, Calcutta.*—This enquiry which has been in progress since 1931 continued to study the protein and polysaccharide structure of the vibrios and has evolved a classification on this basis. Vibrios of the different chemical types have been investigated in regard to their metabolism and are being further examined by precipitin methods in relation to their serological reactivity. A study of changes in chemical structure of single cell cultures was also carried out. This work which is of a long-term nature is expected to throw new light on vibrio structure."

"*Cholera Enquiry under the Director, King Institute, Madras.*—This enquiry has participated in the trials of the dried 'O' antigen. In the course of this work it was found that there was special regional distribution of the Inaba and Ogawa sub-types in Madras Presidency, the Ogawa sub-type which has rarely been found in other parts of India being widely prevalent in the southern areas. The epidemiological significance of this distribution is being investigated. Work on cholera toxin and observations on the carriage of vibrios by flies have also been carried out."

"*Cholera Enquiry under the Director, Pasteur Institute, Shillong,*—The work of this enquiry was partly basic investigations on the vibrios and partly field work on bacteriophage which will be summarised separately. The basic work included trials of the dried 'O' antigens on strains from a variety of sources. Field strains from the Habiganj area which was used for prophylactic bacteriophage experiments were specially examined as to their characters under such conditions. Phage inhibition and precipitin tests were applied to a large series of strains and a grouping was obtained which separates the typical agglutinable vibrio from others.

In addition to these combined studies on the vibrios special work has been done on (*a*) the epidemiology of cholera and (*b*) the value of bacteriophage in treatment and prophylaxis of cholera."

"*The Cholera Carrier and Epidemiological Enquiry at the All-India Institute of Hygiene and Public Health, Calcutta.*—This enquiry investigated the method of spread in a carefully controlled area in relation to cases and carriers. The population in the area was worked

*Accounts of these researches will also be found in the Indian Research Fund Association portion of section VIII of the report (page 214).

over regularly in regard to carrier conditions and the strains obtained were examined by the laboratory section. The significance of the types of strains under different environmental conditions was studied. A statistical study of cholera in Bengal was in progress, with the thana distribution as a basis, to determine the features of each area. This will be of great value in future field investigations. The question of methods of forecast was also taken up and material was collected as a basis for this."

" *Bacteriophage treatment and prophylaxis of cholera.*—Investigations were conducted by the Clinical Enquiry at the Campbell Hospital, Calcutta, and by the Director, Pasteur Institute, Shillong, in selected areas of Assam. The work in the Campbell Hospital consisted of the therapeutic use of bacteriophage in cholera cases under careful conditions of control and that in Assam the prophylactic use of bacteriophage under field conditions. The results of this work, which now terminates, along with those of previous years have been considered and reported on by the Cholera Advisory Committee. The Committee have expressed the opinion, based on the work in Assam, that " no fresh evidence has come to light which would enable them to make a definite pronouncement on the value of bacteriophage for the prevention and treatment of cholera in the field." They also state that " the balance of the available evidence taken as a whole indicates that the widespread use of bacteriophage for the control of cholera and its treatment under village condition has a certain value, the precise degree of which they are not in a position to assess". In considering the figures for the cases at the Campbell Hospital, the Committee noted that when the total cases treated were considered,—their number including many from which agglutinable *V. cholerae* was not isolated,—no appreciate difference was shown in the mortality rates of treated cases and controls. On the other hand, in cases showing typical agglutinable vibrios a definite advantage was shown for bacteriophage treatment in supplementation of the usual methods."

" *Cholera Vaccine.*

" In response to a request from the Far Eastern Bureau of the Health Committee of the League of Nations the Cholera Advisory Committee submitted their opinion on the subject of the methods most suitable for the preparation of cholera prophylactic vaccine. While the Committee was not prepared to lay down the exact lines on which the details of technique for the manufacture of the vaccine should be worked out, they suggested for adoption the following principles which are in accordance with the practice in the majority of laboratories in India :—

" 1. The vaccine should consist of a suspension of the vibrios obtained by washing off the growth from a 24 hour agar culture with 0·85 per cent. saline solution. The vibrios should be killed by the addition of 1 per cent. phenol to the suspension without the application of heat. The phenol should be reduced to 0·5 per cent. in the vaccine finally issued. The vibrio content of the vaccine should be stated and it is recommended that when the vaccine is likely to be used for single dose inoculation of 1·0 c.c. its strength should be approximately 8,000 millions per cubic centimeter.

" 2. The strains ordinarily used for the manufacture of vaccine should show the following characters :—

(*a*) typical smooth translucant colony appearance,

(*b*) stable in salt solution,

(*c*) serological characters of ' O ' group No. 1 (Gardner and Venkataram) sub-type Inaba and should agglutinate to titre with a serum prepared against the dried ' O ' Inaba antigen issued from the Standard Laboratory, Oxford.

" In areas where vibrio strains of O group No. I (Gardner and Venkataram) sub-type Ogawa are prevalent it is advisable to incorporate in the vaccine strains of this type also.

(*d*) producing acid from Mannose and Saccharose but not from Arabinose,

(*e*) non-haemolytic.

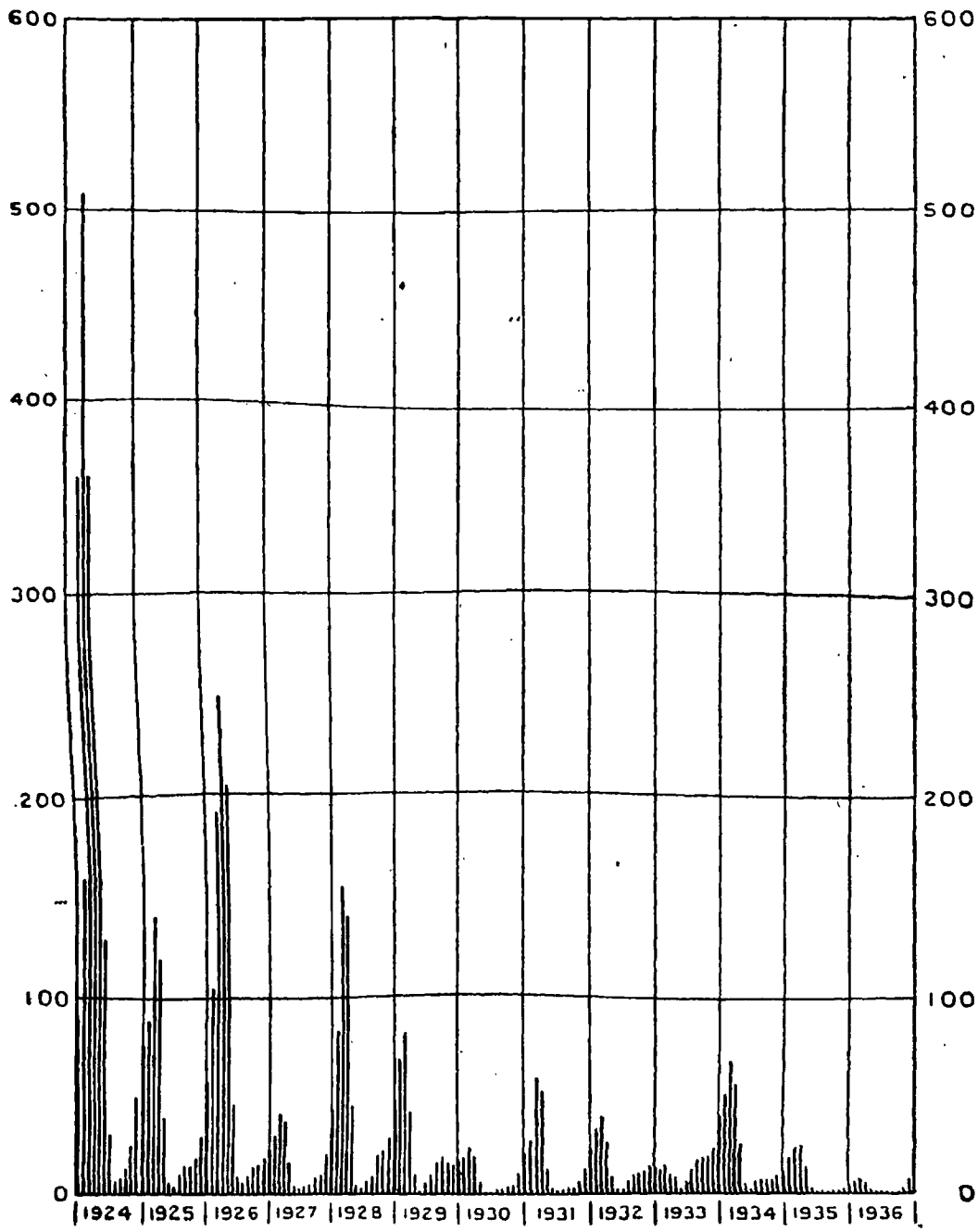
" The strains used should be ones isolated from cases of cholera during an epidemic. Strains which show a high degree of stability and do not vary in their characters on prolonged sub-culture are the most suitable."

Plague.

15. In no case perhaps is Sydenham's famous comparison of the rise and fall of epidemics with the fate of empires more appropriate than with respect to plague. Certain parts of the world seem to constitute permanent endemic

№ 6

MONTHLY PLAGUE MORTALITY RATES PER 100,000 OF ESTIMATED POPULATION IN BRITISH INDIA DURING 1924-36



foci, in which infection is maintained by epizootics amongst the rodent population and from which spread of the disease periodically occurs. "In the South-Western Himalayas it is the rats that are infected, in the Kirghiz Steppes it is the spermophiles, in Transbaikalia the tarbagans, in California the ground squirrels, and in South Africa the gerbilles." Amongst some of these rodents, at least, infection constantly smoulders, now and again flaring up into epizootics of large proportions. Then human outbreaks occur as a result of transference of infection from these animals, sometimes directly but more frequently through the intermediate flea host. Subsequently, the disease travels along the usual trade routes spreading far and wide and setting up new endemic foci which, in their turn, become potent sources of danger to surrounding areas. After varying periods of time, the disease seems to become a spent force and dies out except in its original endemic homes. "In the present state of our knowledge and methods, the extinction of these centres cannot be considered as a near possibility"; the great hope is that, with increasing international co-operation, unrestricted flow of infection from country to country will be effectively checked and that research will eventually provide the solution to the many problems presented by this fell disease.

The historical records of Asia and Europe contain clear references to the numerous pandemics of plague which have periodically devastated those continents. Topley and Wilson have summarised these records in the following words :—

"In the fifth and sixth chapters of the First Book of Samuel there is an unmistakable account of bubonic plague. Before the Christian era 41 epidemics are on record; during the 1500 years following the birth of Christ, there are records of 109 epidemics, including the great plague of Justinians' reign and the Black Death of the fourteenth century. Between 1500 and 1720 there were 45 pandemics of plague. During the 18th and 19th centuries it was comparatively quiescent, being confined almost entirely to endemic foci in various parts of Asia."

In the closing years of the 19th Century, the infection again sprang into activity. Starting in Hong-Kong in 1894, it eventually spread through Asia, to Europe, Africa and North and South America. At the present time, plague is still fairly widely distributed over the world, but within recent years a marked decline in incidence has occurred, particularly in India which for nearly 40 years past has suffered from a severe pandemic. When plague was imported into India in 1896, the disease did not spread widely over the country for about two years. The following table includes figures for the succeeding 38 years, 1898 to 1936 :—

TABLE II (*i*).

Plague mortality in British India.

Period.	Total plague deaths.	Percentage of total for the period 1898-1936.	Annual average.
1898—1908	6,032,693	49	548,427
1909—1918	4,221,528	34	422,153
1919—1928	1,702,718	14	170,272
1929—1936	377,340	3	47,168
	12,334,279		

It is obvious that a continuous decline in incidence has taken place since the first few years of widespread infection. For instance, the total deaths

during 1929-36 represent only about 3 per cent. of the plague mortality during the past 38 years. Further, from the figures given in the last column, it will be seen that, during the last eight years, the average incidence has been only about 28 per cent. of that during 1919—1928, about 11 per cent. of that during 1909—1918 and only about 9 per cent. of that during 1898—1908.

During the year under review deaths from plague in British India numbered 13,021, the lowest figure on record since 1898 and only about 41 per cent. of the figure of 32,091 recorded in 1935. Of the provinces, the N.-W. F. P., Delhi, Orissa, Assam and Ajmer-Merwara were completely free of the disease. Bengal reported one death, Sind 4, Coorg 17 and the Punjab 153. In the other provinces the incidence was higher. The U. P. was worst affected, recording about 56 per cent. of the total mortality in British India. Burma came next with 18 per cent. of the total; Bihar 10 per cent., C. P. 6 per cent., Madras 5 per cent. and Bombay only 4 per cent. Complete provincial figures and rates per mille are given in table E, Appendix II. Compared with 1935, every province except Burma and the Central Provinces recorded decreases.

As regards provincial epidemics, in the United Provinces, total plague deaths numbered 7,290, of which no less than 6,585 or nearly 90 per cent. occurred in rural areas. The provincial rural death rate was 0·15 p. m., but Gorakhpur recorded the high rate of 1·0 p. m. and the rate in Muzaffarnagar was 0·57 p. m., in Azamgarh 0·44 p. m. and in Saharanpur 0·40 p. m. No deaths were reported from the rural areas of 27 districts.

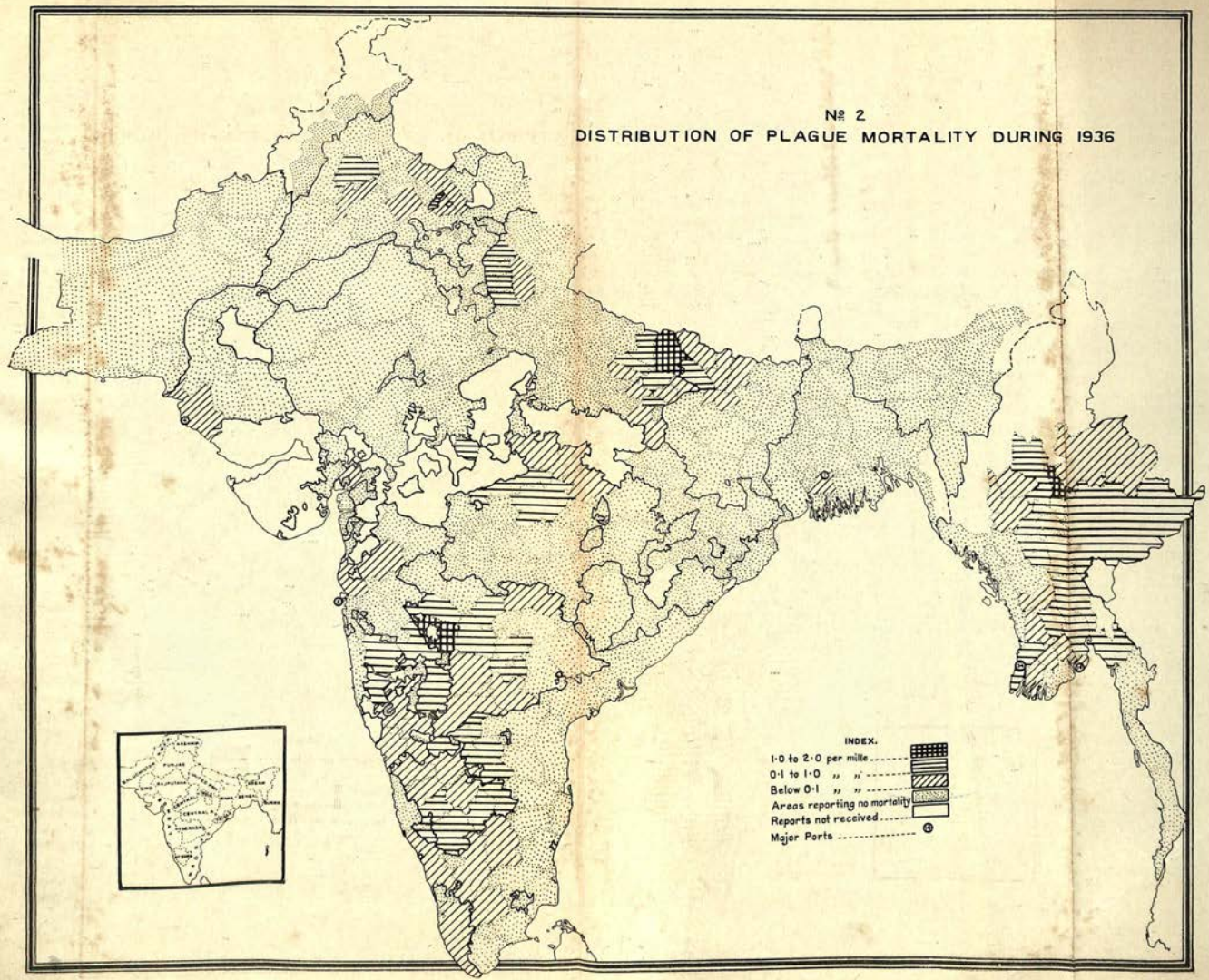
The provincial urban rate was only 0·13 p. m., but very high rates were registered in Pipraich (19·0 p. m.) and in Bansgaon (16·4 p. m.) both in Gorakhpur district; in Jehangirabad (5·5 p. m.) in Bulandshahr district; and in Gorakhpur Notified Area (5·2 p. m.). In 406 towns the disease was absent and in 22 other towns the number of deaths did not exceed 10.

As regards preventive measures, the district health staffs, assisted by travelling dispensaries, inoculated nearly 1,30,000 persons, whilst evacuation of infected dwellings was reported to be more willingly carried out: Regulations under the Epidemic Diseases Act were put into force where necessary.

During the year under review, the number of deaths from plague in Bihar totalled 1,245, or about 44 per cent. of the figure for 1935. The district of Saran recorded 884 deaths or about 71 per cent. of the total for the province. Other districts reporting high incidences were Muzaffarpur and Champaran. The D. P. H. expresses the opinion that "there are certain isolated tracts in the districts of Champaran, Saran, Muzaffarpur, Darbhanga and North Monghyr where plague starts almost every year with the approach of the winter season, reaches its maximum intensity during February and March and declines with the advent of the summer months." Presumably these are endemic foci from which epidemics originate and spread to surrounding areas.

Plague in the Central Provinces during 1936 was apparently of an unusually mild type since out of 8,566 cases only 835 died, a case mortality rate of 9·7 per cent. The disease existed only in sporadic form in the districts of Nagpur, Betul, Mandla and Yeotmal but in Chhindwara, Jubbulpore, Saugor and Hoshangabad it was widely prevalent. The usual preventive measures, evacuation, antiplague inoculation and rat destruction were widely practised in the affected areas.

In Madras Presidency, plague deaths fell to 615, which is the lowest figure recorded since the introduction of plague into the province 38 years


№ 2
DISTRIBUTION OF PLAGUE MORTALITY DURING 1936
INDEX.
1·0 to 2·0 per mille
0·1 to 1·0 „ „
Below 0·1 „ „
Areas reporting no mortality
Reports not received
Major Ports

ago. The three districts of Bellary (213), Madura (187) and Anantapur (126) were together responsible for nearly 86 per cent. of the total deaths; other districts affected were Coimbatore (45), Salem (23) and Malabar (21). Infection spread northwards from the endemic centre in Cumbum Valley in Madura district and Theni, situated at the entrance to the valley, became reinfected after freedom from the disease for over 10 years. There remains to be recorded another of the restricted outbreaks of pneumonic plague which have occurred at intervals since the infection first appeared in this province. On this occasion, a village in Malabar was affected and 12 deaths took place. In addition to the usual preventive methods, cyanogas was widely used in the affected areas, as this gas is now recognised to give very effective control.

In Bombay Presidency deaths from plague numbered only 578, the lowest ever recorded since introduction of the disease in 1896. The high case mortality rate of 66 per cent. was, however, in striking contrast to that recorded in the Central Provinces. The districts of Satara, Sholapur and Dharwar were responsible for nearly 70 per cent. of the total mortality. Bombay City recorded only two deaths.

The usual preventive measures were adopted but in addition cyanogas and calcid fumigations were employed both by Government and by a number of local bodies in the campaign against rats. In order to demonstrate its value as an antiplague measure to local authorities, the Government were carrying out cyanogas operations in villages in the endemic areas.

In Burma, the incidence of the disease was much higher in urban areas than in the rural villages, the death rates for urban and rural populations being 0·92 p. m. and 0·09 p. m. respectively. The worst affected rural districts were Sagaing, Meiktila, Yamethin, Mandalay, Myingyan and Shwebo, whilst of the towns Pyawbwe, Myinmu, Nyaung, Mandalay, Sagaing, Pyinmana, Shwebo and Gyobingauk suffered most.

As regards preventive measures the D. P. H. reports that " fumigation of rat holes with cyanogas has become an established method for keeping down the rat population in any area. The reports received from districts and towns in the country indicate that its use has become universal."

The figures for plague deaths in Indian States are given in Table E (*ii*), Appendix II. Out of a total of 3,986, Hyderabad recorded 1,749 deaths and Mysore 1,372, these States reporting about 78 per cent. of the total. The Deccan States Agency and Kolhapur Residency recorded 396 and the Central India Agency 215 deaths. Rajputana, Baroda, the Eastern States Agency and the States in the U. P., Assam and Baluchistan were free from plague during the year.

The seasonal variations of plague in the provinces were made the subject of brief comment in last year's report. There is little doubt that climatic factors play a considerable part in respect of the variations which occur in different parts of this country.

As regards age distribution, " most authorities are agreed that bubonic plague, whilst comparatively most rampant among adolescents and young adults, causes little havoc amongst infants and young children up to five years ". In this connection, interesting figures have been supplied by the Director of Public Health, Punjab, in respect of age and sex distributions of plague cases recorded in that province during 1935 and 1936.

Age incidence of plague cases in the Punjab during 1935 and 1936.

TABLE II (*ii*).

Age period.	Males.	Females.	Total.	Percentages of the grand total.
Total	636	853	1,489	100·0
0—1	3	3	6	0·4
1—5	36	43	79	5·3
5—10	76	124	200	13·4
10—15.	79	93	172	11·6
15—20.	73	158	231	15·5
20—30.	141	208	349	23·4
30—40.	124	121	245	16·4
40—50.	52	56	108	7·3
50—60.	25	28	53	3·6
60 and upwards . . .	27	19	46	3·1

Of the 1,489 cases, only 6 occurred among infants under one year of age and 85 among children under 5 years of age. Both extremes of life, indeed, seem to show a comparatively low incidence. It must be added, however, that it is impossible to infer that the highest incidence occurred between the ages 15 and 40 years or that females suffered more than males, until the figures in the table have been related to the populations at risk at these ages and for the two sexes.

The epidemiology of plague has perhaps been the subject of more intensive study than that of any other epidemic disease. Whilst the monumental work of the Indian Plague Commission without doubt contributed largely to our knowledge of the disease and pointed the way to modern preventive practice, many obscure points still await elucidation. Researches on plague have, therefore, been in continuous progress at the Haffkine Institute, Bombay, and at other centres in India, whilst field epidemiological studies such as that in the endemic Cumbum Valley area in Madras Presidency, have also been carried out in more recent years.

Certain interesting observations made at the Haffkine Institute have suggested a line of study which might throw some light on the problem of recrudescence of plague epidemics. Examination of the immunity of rats caught in localities subject to recurring outbreaks of plague has demonstrated that these rodents are highly resistant to plague infection and that the resistance is "roughly proportional to the intensity of the epidemic of the locality". The usually accepted conception in this connection is that, when human cases cease, infection continues to smoulder in the rat population as a mild epizootic which produces increased resistance amongst the survivors. In Bombay City, daily examination of large numbers failed to detect even a single rat with signs of infection; and yet the house rat population of Bombay is highly resistant to plague. This resistance cannot be explained in terms of hereditary transmission of immunity. Further, rats obtained from Dharamsala, a hill station in the Himalayas, where plague has never been known to occur since the introduction of the disease into India in 1896, showed a high resistance to infection; in other words, these rats possessed a natural immunity to the disease. A possible explanation of the high immunity

present in rats living in places subject to repeated outbreaks might be the gradual selective elimination of relatively non-resistant strains. During the greater part of the period of investigation in Bombay, the house rat was under examination, it being the species mainly responsible for human plague.

As, however, the observation had been made that the small field rat, *Gunomys various*, was also responsible for spread of the disease in certain localities, a number of these rodents was examined and was found to be highly susceptible to plague. Whatever may be the theory held in respect of the factors determining the start of a plague epidemic, it is certain that this question which is of great importance not only to India but to a number of other countries requires further investigation. The present period of comparative quiescence of the human disease in Bombay and elsewhere seems to provide a favourable opportunity for that research to be carried through with a reasonable prospect of success.

Other questions under investigation at the Haffkine Institute are the production of a potent anti-plague serum to be used in the treatment of plague cases and determination of the optimum conditions under which a prophylactic vaccine of maximum efficieny can be prepared. Field trials with an anti-serum are in progress and, whilst the results obtained so far can be said to be encouraging, a much wider test must be made before its curative value is finally established.

The main lines of investigation in the endemic Cumbum Valley area were noted in last year's report. The value of cyanide products for the fumigation of rat burrows has continued to receive close attention. One series of experiments was planned with a view to determine the intervals at which refumigation of the burrows should be carried out in order to keep the rat population at a low level. During fumigation of rat holes, a number of the rats bolt from their burrows and die in the open, but an unknown number are destroyed in the burrows themselves. In order to ascertain this number 200 fumigated burrows were selected at random and opened up. For every rat which died in the open, about 4 or 5 were found dead inside. With this useful index of the numbers destroyed and after a preliminary census of all rat burrows was made, an investigation was carried out in 8 villages in order to determine the number of rats destroyed during the first and subsequent fumigation operations conducted at intervals ranging from one month to one year. It was found that refumigations done at intervals of over six months were of no value, as by that time both rats and rat burrows had once more increased in number but that " in villages refumigated at shorter intervals than 3 months, a steady decrease in rats and their harbourages was observed, this decrease being more pronounced the shorter the interval." These experiments suggest that, fumigations should be carried out at least once every three months and that the operations should be prolonged over a period of 3—5 years in order to reduce the number of rats below the epizootic level. If the results obtained in the Cumbum Valley area are confirmed in other areas, they will have an important bearing on the problem of prevention of recrudescence of the disease.

Comparative tests with cyanogas and calcid, which the Haffkine Institute found to contain 23·3 per cent. and 46·8 per cent. HCN. respectively, indicated that the efficiency of calcid was double that of cyanogas, although the

risks attendant on the use of the former were naturally greater because of its higher content of HCN. The price of calcid is also twice that of cyanogas.

A summary prepared by the D. P. H. of other investigations carried out during the year in Madras Presidency is given in the following paragraphs :—

Fumigation of various grains, cotton, personal effects, etc.—Either cyanogas or calcid or both were employed in order to arrive at minimum dosages and exposure periods for the satisfactory disinfection of various commodities. Generally speaking, the dose and exposure period, under average humidity conditions of the atmosphere, depend mainly on how dense the commodity is and how much of an impediment it offers to the diffusion of HCN gas. The dose and exposure period have been calculated for most of the commodities available in the Cumbum Valley for fumigation under oil impregnated tarpaulins and in air tight masonry chambers. Considerable experience and expert supervision are essential to obtain correct results and economical use of the cyanide products.

Longevity of starved fleas in rat-proof godowns.—Employing over 100 fleas in each experiment, observations were made in a rat-proof godown packed with different grains, etc. From the floor of the godown no live fleas could be recovered after 6 days. Fleas lodged inside cotton bales and grain bags all died within 4 days. Simultaneous meteorological observations in the godown showed that a high mean temperature was maintained throughout the day.

Study of wild-infected fleas.—The stomach contents and excreta of 126 fleas collected from infected rats were examined to determine the presence or absence of *B. Pestis* and the infectivity of the insects was also tested. Eightyfour fleas were examined in small groups and 42 individually. The excreta was found positive in two groups out of five (38 fleas) and in six individuals out of 34. The stomach contents were positive in all six groups (84 fleas) and in 23 individuals out of 42 examined, of 21 infected fleas allowed to feed on seperate rats, 18 became engorged, but only one of the rats contracted plague. It is to be noted from this small experiment that even the bite of one infective flea seems to be enough to transmit infection to a rat and it also corroborates the view already advanced in previous observations that all infected fleas are not infective.

Carry-over experiments.—Six experiments were carried out during the year mostly during the cold weather. The results of these experiments are summarized as follows :—

(*a*) Fleas fed on artificially immunized rats for about a week, and then fed on artificially infected rats, were able to transmit infection after 20 days' starvation. After 23 days of further starvation, one of the 6 test rats showed at death signs of resolving plague in the spleen, but from this lesion no virulent plague bacilli could be isolated.

(*b*) Fleas, fed on artificially infected rats and subsequently on artificially immunized rats, did not transmit infection when tested after 16 days of starvation. One of the nine test rats however showed a resolving plague-like lesion.

(*c*) Employing gerbil rats and their fleas, it was found that fleas were able to transmit plague after 23 days of starvation.

(*d*) Employing bandicoots and thier fleas, it was found that the fleas were able to transmit plague after 10 days of starvation. Bandicoots generally harbour more *Astia* than *Cheopis* fleas.

(*e*) Employing house mice and their fleas, it was found that fleas were able to transmit infection after 10 days of starvation. House mice harbour very few fleas and these are usually *Astia.*

(*f*) *Ctenocephalides* fleas, abundant in the Cumbum Valley on dogs, cats, cattle, etc., were fed on house rats in order to note their capacity to transmit plague infection. These do not readily feed on rats and none transmitted plague to the test rats.

Intestinal bacterial flora of rat fleas.—Two coliform organisms (*B. faecaelis* and *B. morgani*) were isolated from the stomach contents of normal rat fleas.

Disinfestation for plague.—Several experimental disinfections were done, using 1 in 40 to 1 in 50 cresol, on beaten earth floors of infected houses. After every experiment, it was possible to collect live fleas on guinea pigs. Comparative experiments were done by attempting to scorch the floors with fire, by burning straw or rags soaked in kerosene oil and tied to the end of a long stick. The results definitely proved that, in the hands of careful workers, no better, more economical or more efficient pulicide than fire can be employed. Fleas harbouring in cracks and crevices in the walls or in rat nests in the roofs are not affected by either of these methods, a result which indicates the necessity for repeated treatments.

Transport of fleas and rats in merchandise.—Employing guinea pigs freed from fleas, 394 grain loaded carts, 231 empty gunny bags, 45 bags of rice, one of paddy, 12 of dhal, five of vegetables and the personal effects of 129 passengers were searched for fleas at the Kumili plague camp. Only three ctenocephalide fleas were obtained, one from ragi, one from cholam and the other from a grainloaded cart. One *P. irritans* was obtained from the pet guinea pig of a passenger.

Monthly rat flea surveys were continued during the year; the results have corroborated previous findings.

Micro-climatology of rat burrows.—The prevailing temperature of rat burrows corresponds almost to the minimum temperature of the outside air and exhibits only a very limited range of variation. The saturation deficiency of the air in rat burrows is decidedly lower than that of the outside air. These two factors put together provide optimum conditions for flea breeding and for survival of infected fleas for much longer periods than under conditions obtaining outside.

In conclusion, it may be remarked that although persistent and painstaking research has considerably advanced our knowledge of the biology of plague, many of the problems associated with this disease still remain unsolved and epidemiologists must admit with Greenwood, that "in spite all that we have learned in detail, we can answer the great questions no more successfully than our ancestors. We know no better than they did why pandemics occur, and even for us there is some magic in the title 'The Plague', some sense of the fearful unknown."

Smallpox.

16. The persistence of smallpox infection and the occurrence of periodic severe epidemics in different parts of India make it clear that, although in vaccination we possess a powerful preventive weapon, that weapon has at no time during the past 56 years been used as effectively as it might. In the following statement are given the mean quinquennial deaths from smallpox and the corresponding mortality rates per mille of the population in British India from 1880 onwards :—

TABLE II (*iii*).

	Average number of deaths.	Mean rate per mille.
1880-84	154,933	0·8
1885-89	79,344	0·4
1890-94	81,447	0·4
1895-99	89,444	0·4
1900-04	88,264	0·4
1905-09	111,276	0·5
1910-14	74,790	0·3
1915-19	87,071	0·4
1920-24	56,415	0·2
1925-29	98,051	0·4
1930-34	68,516	0·3
1930	72,813	0·3
1931	37,272	0·1
1932	44,925	0·2
1933	103,641	0·4
1934	83,928	0·3
1935	90,703	0·3
1936	**104,805**	**0·4**

It must be remembered that, in the earlier years of the period included in this statement, registration was not so accurate as at present, so that although it would seem from the figures that little reduction in the incidence of smallpox has been effected, in actual fact a considerable decrease has occurred.

In last year's report, mention was made of some of the factors which handicap effective control of this disease and provincial reports for 1936 indicate that these factors still exist in most parts of the country. In spite of the fact that the supplies of vaccine lymph are prepared with skill and care and that these possess a high potency, vaccination staffs continue to be insufficient in numbers and the supervision of their work is not sufficiently detailed to ensure that the population is adequately protected. Whilst millions of persons are vaccinated or revaccinated each year, no public health department is sufficiently manned to enable it suitably to deal with the whole of the population under its control and, until this is done it will be impossible to ensure that smallpox disappears from the list of epidemic diseases from which India continues to suffer. This is no mere theoretical dictum, as will be clear from the history of smallpox in the Philippines. Dr. Heiser, late Director of Public Health in the Phillippine Islands, has described events in the following terms :—

"The value of vaccination and its comparative harmlessness have perhaps never been more completely demonstrated than by the experience in the Phillippine Islands, where for many years smallpox caused more than 40,000 deaths annually, until systematic vaccination of all the inhabitants caused the disease to disappear. Thus, after vaccination of the inhabitants of the six provinces in the vicinity of Manila which had an annual mortality of 6,000 from smallpox, the deaths from this disease were reduced to insignificant numbers. In Manila, with a population of over 250,000 not one death from smallpox occurred in a period of seven years. On the other hand, between 1915 and 1919, when the vaccination of new-born children and new arrivals in Manila was not effectively carried out the disease promptly reappeared, and in the summer of 1918 over 700 deaths from smallpox were reported in Manila alone. More than ten million vaccinations were performed between 1905 and 1915 without loss of life or limb, showing that vaccination in itself is practically unattended with any risk."

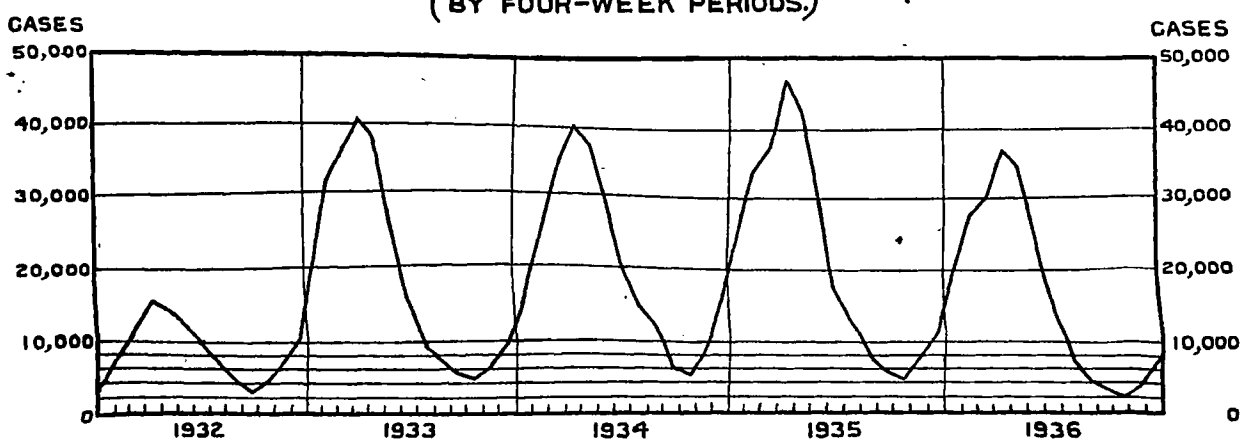
The question of improving vaccination in the provinces has been further discussed in Section VI of this report. In the meantime, attention may be drawn to Dr. Heiser's remark regarding the harmless nature of vaccination, since the antivaccinationist is always on the look-out for arguments to discredit the valuable weapon which the genius of Jenner placed at the disposal of the practitioner of preventive medicine.

Within recent years, a new complication following vaccination has been reported from a number of western countries. This complication, which occurs very rarely, takes the form of an acute nervous disease developing in children about 10-14 days after the vaccination operation. The first case was noted by Turnbull in 1912, but serious attention was drawn to the subject only in 1926 on the publication of a report by Turnbull and McIntosh. The condition has been termed " post-vaccinal encephalitis " and two views have been expressed regarding its causation. A Committee on Vaccination appointed by the Ministry of Health in England stated that " it is our considered opinion that the co-operation of vaccinia with the virus of poliomyelitis or of encephalitis lethargica or possibly some unknown neurotropic virus harboured by a vaccinee must for the present be retained as a working hypothesis of causation ". On the other hand, McIntosh advanced the view that post-vaccinal encephalitis might be due to the vaccinia virus itself. Whichever view is correct, the great rarity of the condition requires to be emphasised. The figures collected by the Health Ministry's committee showed that the ratio of cases to the number of vaccinations was less than three per million. Further

№ 7

SMALLPOX CASES REPORTED DURING THE YEARS 1932-1936

(BY FOUR-WEEK PERIODS.)



NOTE-Reproduced from the League's Weekly Epidemiological Record for April 29th. 1937 R.H.583.

the Chief Medical Officer to the Ministry of Health, England, pointed out in his annual report for 1935 that in countries affected by this complication of anti-variolous vaccination, its incidence had decreased in every country, with the sole exception of the Netherlands. In the United States of America, only one case was reported during the year 1934-35, two cases in Sweden, two in Switzerland and four cases each in Germany and the Netherlands.

Provincial public health departments in India have been for some years past on the look-out for cases of post-vaccinal encephalitis, and the first case was reported last year from the Punjab. In view of the importance of this complication, a full description of the case will be of interest.

Ramesh Chander, son of L. Bakhshi Ram, a male Hindu child of eleven months, was vaccinated on the 2nd July 1936 with fresh vaccine lymph obtained from the Punjab Vaccine Institute, Murree. The operation was performed on the left arm, four separate circular insertions each about a quarter of an inch in diameter and about half an inch apart being made with a rotary lancet. The vaccination was done by a municipal vaccinator who, as far as could be ascertained, had taken every precaution to avoid sepsis. The child was in good health at the time of vaccination and the operation, as exhibited by the 'take', was successful and unattended by any local or general symptoms except the usual rise of temperature about the seventh day of vaccination and stiffness of the arm, these symptoms passing off in due course. Eleven days after vaccination, the parents noticed that the child's right eye was partially closed and there was restricted movement of the left arm and leg. The child's medical attendant and consultants made the following observations :—

The child when first examined on the 13th July, *i.e.*, 11 days after vaccination, presented the following symptoms :—

1. Fever 101°F. ; pulse and respiration corresponded to the rise of temperature.

2. The child was unconscious and the angle of the mouth was drawn to the right.

3. Eye-balls were fixed, corneal reflex absent, pupils were pin-point and did not re-act to light ; there was ptosis of the right eye-lid.

4. The tongue was deviated to the right.

5. The lower jaw was stiff.

6. Superficial reflexes were present and the knee jerk was much exaggerated ; there was no head retraction and Kernig's sign was absent.

7. There was right facial paralysis and slight paresis of the left leg.

8. No history of vomiting. The temperature continued to rise, on the third day of illness (16th July) being 102·8°F. On that day, an intramuscular injection of anti-tetanic serum was given, which was followed by a rise of temperature to 105·9°F. next morning. The temperature then gradually fell to normal on the 14th day of illness, *i.e.*, 25 days after vaccination. The stiffness of the lower jaw continued till the tenth day, whilst the condition of the eyes began to improve from the third day of illness. The improvement first started in the left eye and then in the right, and by the 11th day of illness they had returned to normal. During the course of the illness (from the fourth day onward) the child had occasional convulsive fits of the arms and legs. The fits, numbering about six a day occurred over a period of three or four days. The paresis of the muscles of the leg and face gradually passed off and the child made a complete recovery.

9. Blood examination did not reveal the presence of malaria parasites.

10. Lumbar puncture showed that the spinal fluid was not under pressure. There was slight increase in globulin and normal reduction of Benedict's solution. No evidence of bacterial infection or other abnormality.

Differential Diagnosis.—Trauma to Skull.—Trauma to the skull can be excluded, because there was no history of a fall or injury to the head.

Cerebrospinal fever.—The absence of head retraction and Kernig's sign ; the condition of the cerebrospinal fluid ; and the absence of meningo-cocci rule out this infection.

Diagnosis—The cerebral symptons, together with pin-point pupils in a child who was healthy before vaccination and the onset of the symptoms about 11 days after vaccination suggested that the case was one of post-vaccinal encephalitis.

A detailed enquiry was made in order to ascertain whether any other case had occurred from the same batch of lymph which had been issued to a large number of medical officers throughout the province. No untoward results were reported.

As this was the first occasion on which the syndrome had been observed in India, the Chief Medical Officer of the Ministry of Health in England was consulted and he agreed that the diagnosis was correct.

A detailed description of the case has been given in order to invite the renewed attention of all public health officers in this country to the importance of reporting the development of any unusual post-vaccinal occurrences.

Certain other facts remain to be mentioned. The Health Ministry's committee on vaccination pointed out " the extreme rarity of such manifestations particularly after revaccination and after primary vaccination in early infancy ". As a matter of fact, most of the reported cases have followed primary vaccination in children of school age. In the opinion of the committee, " early infancy remains, therefore, the time of choice for primary vaccination ". As in India there is almost constant risk of exposure to infection, it is all the more necessary in this country to carry out primary vaccination during infancy.

During 1936, the total number of deaths from smallpox in British India was 104,805 as compared with 90,703 for 1935. For British India as a whole and for individual provinces, rural and urban deaths and the corresponding rates per mille are given in Table F, Appendix II ; Table G gives the monthly distribution. Of the provinces, Bengal recorded a large increase, *viz.*, 46,267 deaths as compared with 7,548 in 1935. Bihar, the Punjab, Assam and Burma also recorded higher incidences. With respect to the new province of Orissa, the figure for 1935 is not available, so that it is not possible to give comparative figures. In the N.-W. F. P., the figure was practically the same as in 1935, whilst in the remaining provinces a reduction in mortality occurred.

For British India as a whole a small reduction was recorded in urban areas (17,391 as compared with 18,257 in 1935), but an appreciable rise occurred in rural areas (87,414 and 72,446 respectively).

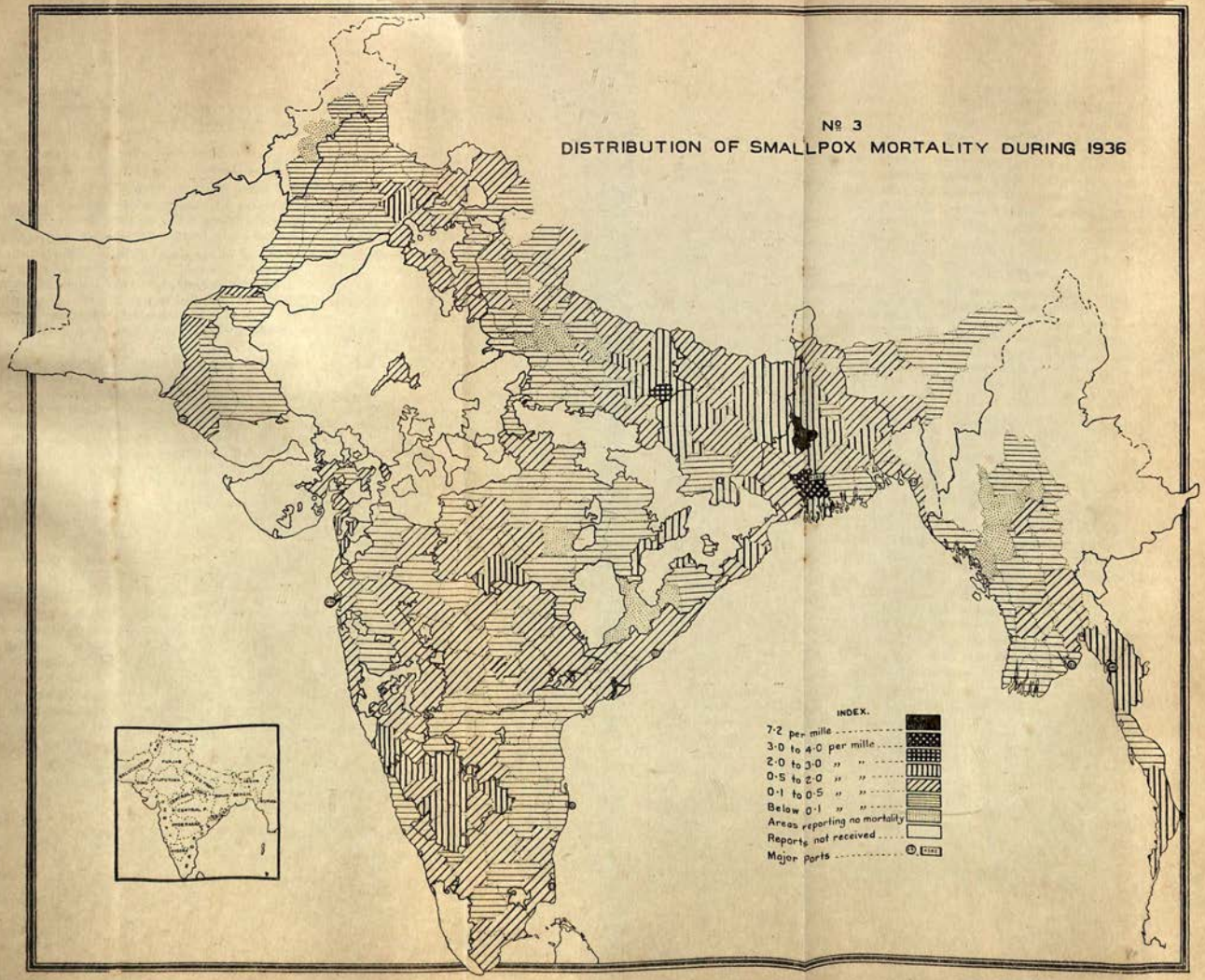
As usual, the disease reached its peak incidence during the second quarter, the majority of the deaths were recorded during the first half of the year, and the lowest figure occurred during October. Generally speaking, this description holds good for the whole of Northern India, including Bengal and Assam, but in Madras Presidency the epidemic reached its height in January, the largest figures being recorded during the first quarter. Bombay occupied an intermediate position between Madras and the northern provinces, in that the peak in the former area was reached in March or before the end of the first quarter.

The following table gives for British India the percentages of deaths due to smallpox at the ages 0-1 and 1-10 to total smallpox mortality :—

TABLE II (*iv*).

Percentage of smallpox deaths to total smallpox mortality in British India.

	Under 1 year.	1—10 years.
1932	15	24
1933	16	26
1934	19	27
1935	20	29
1936	13	23


№ 3
DISTRIBUTION OF SMALLPOX MORTALITY DURING 1936
INDEX.
7·2 per mille
3·0 to 4·0 per mille
2·0 to 3·0 " "
0·5 to 2·0 " "
0·1 to 0·5 " "
Below 0·1 " "
Areas reporting no mortality
Reports not received
Major ports

Caution must be exercised in attempting to interpret these figures, because the statements of age probably contain a considerable margin of error.. The great disparity between the rates recorded in different provinces in the two age-groups, (*e.g.*, 0·5 per cent. in Orissa and 37·3 per cent. in Delhi Province for the age period 0-1 and 11·3 per cent. in Orissa and 74·2 per cent. in Coorg for the age period 1-10) also throws doubt on their accuracy. Taking the figures as they stand, however, since the numbers in the age groups 0-1 and 1-10 constitute approximately 3 per cent. and 25 per cent. respectively of the total population, selective smallpox mortality amongst infants is clearly indicated, and this again emphasises the importance of early primary vaccination. In regard to children between 1 and 10 years, it does not appear that this group experienced a higher smallpox mortality than would have been the case if the deaths had been evenly distributed through all age-periods.

Coming to the epidemics in individual provinces, Bengal reported the largest mortality, deaths numbering 46,267 or about 44 per cent. of the total recorded in British India. Compared with 1935, the increase was as high as 800 per cent. and, in comparison with the previous quinquennium, the increase was about 350 per cent. Of the total provincial mortality, smallpox accounted for 3·8 per cent. No less than 614 of the 712 registration circles were affected during the year whilst 9,793 villages out of a total of 86,361 were infected.

The mean monthly smallpox mortality figures in Bengal for the period 1926—35 show that the lowest incidence occurs in October and November, a rise beginning in December makes a steep ascent and reaches its maximum in April after which a steady decline takes place. As communications in this province, particularly in Eastern Bengal and in the deltaic districts of the Ganges and the Brahmaputra, become very difficult during the monsoon period, the annual vaccination campaign should be commenced as soon as the monsoon tails off in September so that the dry months of October and November may be utilised for vigorous immunisation of the population before the next smallpox season begins. It is obvious from the recorded figures that a great deal remains to be done in this province before it can hope to escape smallpox epidemics such as occurred during the year under review.

The rural and urban death rates were 0·8 per mille and 2·8 per mille respectively, the combined rate being 0·9 per mille. Eight districts showed rates higher than the provincial average. Murshidabad recorded the terribly high rate of 7·2 per mille, whilst Bakarganj had the lowest rate, *viz.*, 0·03 per mille.

Of the 9,918 smallpox deaths recorded in urban areas, Calcutta was alone responsible for 4,382 or 44·2 per cent. of the total. Twentythree towns had rates higher than the average, five of these ranging between 8·9 per mille and 14·3 per mille. The only conclusion one can draw from such figures is that vaccination in those towns has been totally neglected for a considerable term of years.

In Bihar, smallpox deaths numbered 22,863 against 17,433 in 1935, the mortality rate being 0·7 per mille. The general rural and urban rates were both 0·7 per mille, but district figures ranged between 2·0 per mille and 0·1 per mille. Individual towns reported much higher mortality, three recording rates of 5·6, 2·6 and 2·4 per mille respectively. The remark already made in regard to certain urban areas in Bengal apply equally to these towns in Bihar.

In Orissa, smallpox deaths totalled 3,789, the death rate being 0·5 per mille. Rural areas suffered more than urban, the death rates being 0·5 per mille and 0·2 per mille respectively. The highest district death rate was 1·3 per mille and the lowest 0·2 per mille; the highest urban rate was 0·8 per mille.

Assam reported increased smallpox mortality, total deaths being 963 as compared with 529 in 1935 and the death rates 0·12 and 0·07 per mille respectively. Only five towns reported smallpox deaths, and of 28,333 villages only 324 were affected. The highest rural rate was 0·4 per mille and the highest urban rate 2·4 per mille.

The United Provinces recorded a smallpox mortality rate of 0·3 per mille, the number of deaths being 14,849 as compared with 26,032 in 1935. The quinquennial average was 0·2 per mille. The rural and urban death rates were almost identical at 0·3 per mille. In rural areas, the mortality rates varied between 2·12 and 0·01 per mille, but in a number of towns very high rates were recorded. When smallpox death rates of 18·5, 15·5, 14·7 and 10·6 are registered in urban areas, it is clear that vaccination work must have been consistently neglected there over a period of years.

In the Punjab, smallpox deaths numbered 2,613 against 1,822 in 1935. The D. P. H. has noted that during the last 25 years this disease has appeared in successive waves of high prevalence at intervals of about five years and that during 1936 the curve was beginning to rise after being at a minimum. The death rate was 0·11 per mille against 0·08 in 1935 and 0·20 for the previous quinquennium. Urban and rural rates were 0·19 and 0·10 per mille respectively. Every district except Simla was infected, whilst 66 of the 176 towns reported cases. The D. P. H. has expressed the opinion that the greatest obstacle to the control of smallpox is the tendency of the villager to conceal cases and the failure of village officials to report cases until after infection is well established.

Smallpox in Sind existed in a comparatively mild form, the deaths totalling 308 against 571 for 1935 and the death rates being 0·07 and 0·14 per mille respectively. Of 26 towns and 9,095 villages, 7 towns and 70 villages were infected.

The number of smallpox deaths in Bombay Presidency fell from 13,435 in 1935 to 4,320 in the year under review. The death rates were 0·24 per mille for 1936, 0·75 per mille for 1935 and 0·32 per mille for the quinquennial mean. The D. P. H. has noted that smallpox follows a cycle of 5 to 7 years. If the ratio of deaths to attacks is any criterion, the virulence of infection seems to have decreased as it is not uncommon for officers of the public health department to find villages reporting 20, 30 or 60 cases without a single death. The D. P. H. has reported the encouraging fact that there has been recently an increasing demand from municipal councils for compulsory vaccination. The number of towns in which compulsory vaccination is in force has increased from 18 in 1934 to 41 in 1936, these figures excluding Bombay and six cantonment areas. Even so, the D. P. H.'s report states that the response on the part of the people to vaccination still leaves much to be desired. Investigations carried out during the year by the Inspector of sanitation and vaccination showed that in Ratnagiri district alone nearly 20,000 children remained unprotected during the past three years.

In the Central Provinces 2,318 smallpox deaths were recorded as compared with 2,802 during 1935. As the D. P. H. has observed, however, the registration of 3,042 deaths under chicken-pox "gives an entirely inaccurate picture

of the true extent of the prevalence of smallpox". About 92 per cent. of the total deaths took place between January and June; a rapid decrease then occurred, the minimum of five being reached in November.

During the year under review, Madras Presidency recorded the smallest smallpox mortality during the past seventy years, total deaths numbering 4,581 as compared with 12,330 in 1935. Only on two previous occasions, *viz.*, in 1931 and in 1895, have the annual deaths approached this small total. At the same time, no district was completely free of infection and this fact alone makes it evident that further vigorous efforts will be necessary before the disease is likely to be eradicated. The municipal smallpox death rate was 0·14 per mille as compared with 0·41 per mille during the previous year.

The following table showing the distribution of smallpox mortality in the different age periods during the previous decade, has been taken from the D. P. H's. report :—

TABLE II (*v*).

Year.	Under one year.		1 to 10 years.		Above 10 years.		Total.
	Deaths.	Percent. age to total.	Deaths.	Percent. age to total.	Deaths.	Percent. age to total.	
1927	3,402	44·4	2,426	31·2	1,928	24·8	7,788
1928	3,069	40·3	2,393	31·4	2,156	28·3	7,611
1929	3,431	35·3	2,917	30·0	3,360	34·7	9,708
1930	2,324	33·5	1,865	26·9	2,753	39·6	6,942
1931*	1,610	40·2	907	22·6	1,488	37·2	4,005
1932	1,455	27·1	1,686	31·4	2,222	41·5	5,363
1933	3,081	28·7	3,009	28·0	4,655	43·3	10,745
1934	5,593	30·9	5,516	30·5	6,979	38·6	18,088
1935	3,338	27·1	3,751	30·4	5,241	42·5	12,330
1936	1,232	26·9	1,327	28·9	2,022	44·2	4,581

His remarks on these figures may be quoted :—

"The above table is very instructive and furnishes striking evidence of the steady shift of the incidence of smallpox to older ages. For a correct evaluation of the age incidence of the disease it will be necessary to take the age specific death-rates of the populations actually exposed to smallpox. This is not possible under present conditions. There is, however, no reason to suppose that the age-distribution of the population has materially changed during the decade nor is there any evidence to show that there was any variation in the rate of exposure of the different age groups to smallpox infection. Valid inferences can, therefore, be drawn from the percentages exhibited in the above table. The gradual but steady shifting of the incidence of smallpox to older ages and the progressive reduction in the general mortality from the disease are all direct results of the steady improvement in infantile vaccination."

Whilst it may be true that the incidence of smallpox mortality in the infant population in Madras Presidency has been falling during recent years, the figure of 26·9 per cent. for 1936 must still be considered as high. Moreover, examination of the figures set out in Table II (*iv*), which gives the percentages of infant smallpox deaths for British India during the past five years, shows that there is no definite indication of a decrease. It is almost certain that conditions vary from province to province, so that the experience of Madras cannot be applied to other provinces or to the country as a whole.

Burma recorded a slight increase in smallpox mortality, total deaths numbering 1,354 as compared with 1,262 in 1935. Its prevalence in rural areas was definitely higher than in urban areas, the rates being 0·7 and 0·4 per

*Exclusive of figures for five districts.

mille respectively. Several factors were reported as making difficult an effective campaign against the disease. For instance, in one district, inoculation was widely practised, in another, considerable opposition to vaccination was met with, the people running into the jungle on the arrival of the vaccinator and public health inspector. The districts of Thaton, Amherst, Mergui, Henzada and Toungoo reported the highest incidence of the disease whilst the towns worst affected included Mergui, Thaton, Nattalin and Gyobingauk.

Fevers.

17. The omnibus group of diseases included under ' fevers ' was responsible for 3,593,497 deaths in British India during 1936, a figure less than that of 1935 by 161,524, but one which still amounts to nearly 56 per cent. of the total mortality. The death rate per mille of population was 12·7 as compared with 13·5 during the previous year. Figures for individual provinces and the corresponding rates will be found in Table H, Appendix II. Every province recorded a decline in the " fevers " mortality rate except Bengal, Central Provinces, Coorg and Burma although the increases in the first three were relatively small. Coorg recorded the highest rate (17·9), followed by Central Provinces (17·3), United Provinces (16·5) and Bihar (16·0), whilst at the other end of the scale were Madras (5·8), Sind (6·6), Burma (8·1) and Bombay (8·4). Every province in Northern India except Assam and the Central Provinces recorded mortality rates above the average for British India (12·7) whilst Southern India, including Bombay and Burma, returned rates below the average.

Table H, Appendix II, shows that as usual " fevers " were relatively more prevalent in rural areas, the urban rates in every province being smaller than those of rural areas.

This heterogeneous group no doubt mainly consists of deaths from malaria but it also includes large numbers of deaths from other diseases in which fever is a prominent symptom. From the epidemiological and preventive points of view, differentiation of this great mass of figures is more than desirable but with the existing machinery for registration of vital statistics it is almost impossible to obtain any degree of accuracy in diagnosis of the causes of death. Bearing this in mind, it is of interest to examine the relative incidence of certain diseases included in this group, figures for which are available for the provinces of the Punjab and Bengal.

TABLE II (*vi*).

Punjab.			Bengal.		
Disease.	Deaths reported.	Percentage of the total.	Disease.	Deaths reported.	Percentage of the total.
Malaria . .	168,927	45·0	Malaria . .	337,647	47·1
Enteric fever . .	6,512	1·7	Kala-azar . .	21,161	3·0
Measles . .	1,340	0·4	Enteric fever . .	8,359	1·2
Relapsing fever .	48	0·01	Measles . .	4,549	0·6
Influenza . . .	47	0·01	Influenza . .	2,502	0·3
Cerebrospinal fever	91	0·02	Relapsing fever .	7	0·0
Typhus fever .	2	0·00	Typhus . .	1,551	0·2
Other fevers . .	197,850	52·8	Cerebrospinal fever	910	0·1
			Blackwater fever .	115	0·01
			Other fevers . .	339,341	47·4
Total . .	374,817	..	Total . .	716,142	..

Whilst little or no reliance can be placed on the accuracy of these figures malaria stands out as the most important disease in both provinces and the proportion that malaria bears to the total fever deaths does not differ to any great extent in the two areas. At the same time the large mortality from kala-azar, the relatively high incidences of influenza, cerebrospinal fever and typhus and the comparatively high figure for blackwater fever in Bengal indicate that considerable differences exist between individual provinces and it would be of great value if provincial D. P. H.s could undertake similar analyses of the causes of deaths included in this group of diseases. Every investigation of the kind, however restricted as to area or population, would throw some much needed light on conditions which are at present entirely unknown.

From what has already been said, it is obvious that no useful purpose would be served by discussing the mortality figures for 'fevers' recorded in each province. The seasonal distribution of these deaths for British India and for each province are given in Table I, Appendix II.

Malaria.

18. In last year's report it was suggested that the annual deaths from malaria in British India might total approximately one million and a quarter. The recorded figures for 1936 amount to 1,567,084, but there is reason to think that this may be a somewhat exaggerated statement of the true position. In regard to the incidence of the disease, it has also been estimated that about a hundred million persons suffer from malaria every year. During the past decade cholera, smallpox and plague, the three infectious diseases which generally attract most notice, were together responsible for about 357,000 deaths each year, a figure which is less than one-third of the annual toll of life taken by malaria. It is, therefore, certain that malaria constitutes the major public health problem in India, both from the point of view of morbidity and of mortality.

Table II (*vii*) gives total hospital attendances for malaria by provinces during 1936.

TABLE II (*vii*).

	Cases.	Per cent. of total cases treated.
Total	12,039,077	17
N.-W. F. P.	497,295	23
Punjab	1,994,392	14
Delhi	142,648	12
U. P.	1,497,346	18
Bihar	1,092,842	21
Orissa	315,726	18
Bengal	2,880,762	36
C. P.	568,016	17
Bombay	557,704	19
Sind	198,244	22
Madras	999,612	6
Coorg	117,971	37
Assam	663,638	30
Burma*	412,232	12
Baluchistan	100,649	15

*Including Shan States.

As regards individual provinces; in the N.-W. F. P., malaria continued to be the most prevalent disease. In Kohat, Bannu, Dera Ismail Khan, Nowshera and other cantonments, the military medical authorities carried on antimalarial measures in and around their areas. In the civil areas of Peshawar cantonment, the work was taken over by the public health department. Paris green and kerosine oil emulsion were used as larvicides. *A. stephensi* and *A. culicifacies* were the important carriers. Spleen rates were only a little over one per cent., whilst no malarial parasites were found in blood films taken during June and July. The D. P. H. concluded that malaria was not endemic, but that the area was liable to epidemics when conditions became favourable.

During 1936, the Punjab was only mildly affected with malaria, the relatively low figures for 'fevers' during September, October and November being an indication of the low incidence of infection. The malaria forecast proved to be reasonably accurate and was of value in carrying out the relief programme. A scheme was put into operation under which small doses of quinine were given twice a week to school children during September, October and November in areas where, according to the forecast, a high incidence of the disease was anticipated.

In the United Provinces, deaths reported to be due to malaria numbered 751,712 against 815,591 during 1935, the rates being 15·5 per mille and 16·8 per mille respectively. Malaria was, therefore, the recorded cause of death in nearly 70 per cent. of the total deaths in the province. The main activities of the malaria branch of the public health department included (*a*) the supervision of antimalarial measures at Banbassa at the headworks division of the Sarda Canal, (*b*) antimalarial operations in the Tarai and Bhabar Estates, (*c*) investigations into the incidence of malaria in various parts of the province, (*d*) a study of the effects of combined plasmoquine and quinine treatment and (*e*) a course of training in malariology including field work to 14 students in the L. P. H. Class.

In Bihar, severe outbreaks of malaria occurred in parts of North Bihar including the districts of Muzaffarpur, Darbhanga, Bhagalpur and Purnea, whilst the endemic areas of Champaran and Manbhum districts also recorded increased incidences. Of the total deaths, about 78 per cent. were recorded as due to 'fevers' and there is little reason to doubt that malaria was the predominent disease in this province.

Almost the whole province of Orissa is regularly subject to malaria and during 1936 a severe epidemic took place in the areas along the foreshore of the Chilka Lake, causing in the 98 villages affected about 6,000 attacks. In this area malaria of a severe type breaks out every year. The Puri district board appointed two doctors and three compounders to carry out a campaign of cinchonisation of the people. The D. P. H. reported that, whilst no organised action had previously been taken to combat malaria in the province, with the appointment of a Special Malaria Officer and staff, it was hoped shortly to open a preventive campaign.

In Bengal malaria deaths decreased from 342,955 in 1935 to 337,647 during the year under review, the rates being 6·9 per mille and 6·8 per mille respectively. Nearly 59 per cent. of the total mortality was recorded under "fevers" and malaria deaths amounted to nearly 47 per cent. of that group. Recorded deaths from malaria fell to a minimum, in May, but increased incidence began in June and reached a maximum in November.

The provincial death rate from malaria was 6·8 per mille. Twelve districts recorded rates above this average, whilst in Howrah district and in Calcutta the rates were only 1·2 and 0·5 per mille respectively. Rural and urban death rates were 7·2 per mille and 0·6 per mille. In 45 towns, the recorded death rates were above the provincial urban average. The two towns of Asansol and Tollygunj returned the low rates of 0·03 and 0·04 per mille respectively.

In Assam, malaria was prevalent throughout the year, often in epidemic form, and this disease as usual formed the great scourge of the province. The total recorded mortality under "fevers" showed a reduction from 106,719 in 1935 to 97,240 in 1936. As separate figures for malaria are not available, it is not known whether the incidence of malaria underwent a corresponding reduction. In order to bring treatment within easier reach of the people, tubes containing 10 tablets of four grains each were sold at 2 annas a tube. The tablets consisted of reinforced cinchona febrifuge. Malaria research was encouraged by the usual Government grant of Rs. 25,000 to the Assam Medical Research Society, a brief account of whose activities will be found in Section VIII (page 216).

As regards the Central Provinces the figures for treatment of malaria cases in hospitals and dispensaries show that the districts worst affected were Buldana, Akola, Nagpur, Amraoti, Chhindwara, Raipur, Hoshangabad, Nimar and Saugor. A travelling dispensary worked in the Melghat forest area and in the adjoining *ryotwari* tract of Amraoti district and an epidemic dispensary worked in Mahadwani tract of Mandla district. Antimalarial operations were carried on in a few towns.

Recorded malaria deaths in Bombay Presidency numbered 27,307 against 29,046 in 1935. The highest mortality occurred during December (3,396) and the lowest during June (1,441). A progressive increase took place from June to December.

During the malaria season, 42 subordinate medical officers were appointed to visit villages in the most malarious parts of the province and to treat cases of fever. Their services were also utilised for other emergencies such as cholera outbreaks. These doctors visited 4,503 villages and treated over 67,000 cases of malaria. A spleen census carried out in these villages showed that of 94,643 children examined 34 per cent. had enlarged spleens.

The number of malaria deaths in Sind totalled 1,627 against 2,176 in 1935, the death rates being 0·42 per mille and 0·56 per mille respectively. The highest figure was recorded in March and the lowest in July.

As regards urban areas Karachi alone was provided with a fairly adequate staff for anti-larval and anti-mosquito measures. For rural areas, no such staff existed but ten temporary touring medical officers were appointed to carry out malaria treatments in rural areas, to take spleen censuses, to map out mosquito breeding places, to send specimens of mosquitoes for identification at headquarters and to advise the people in regard to simple antimalarial measures. These officers visited 563 villages and treated 11,430 malaria cases. Of 11,866 children and adults examined, about 41 per cent. were found to have enlarged spleens. The D. P. H. has recommended the appointment of a malariologist for the province, the constitution of central and district mosquito destruction boards, the appointment of district health officers and the

institution of travelling motor dispensaries for carrying out treatment and propaganda.

In Madras Presidency, the execution of antimalarial works, financed from a grant given by the Government of India, was an important feature of the year under report. These works included the filling up of man-made pits in certain coastal tracts and the introduction of subsoil drainage in two areas. Malaria surveys were carried out in two urban areas and a survey of the Cauvery-Mettur Project irrigation area in Tanjore district was begun. Following the completion of this irrigation project, malaria has started much earlier than was expected and a detailed study of the problem was commenced after the establishment of a field station at Pattukkottai under the supervision of Dr. Paul Russell, who has been permitted to undertake this task by the authorities of the Rockefeller Foundation. Mr. Carter, a Sanitary Engineer belonging to the staff of the Rockefeller Foundation, also toured some of the worst malarious tracts of the province and offered valuable suggestions in relation to the engineering aspects of the malaria problems in those areas.

The question of epidemic malaria in Bellary district was under investigation during the year, observation stations being established at four different field centres. Antimalarial operations were continued in five centres in the Vizagapatam Agency, in Rameshwaram Island, in Hospet Municipality, in Mettur and in some parts of Nellore, Chingleput and Kurnool districts.

Anti-mosquito measures were carried out in a number of municipalities with great relief to the inhabitants. The scheme for free distribution of quinine was in force in 14 districts, the work being extended to parts of three districts during 1936. Stegomyia control measures were also in progress in Madras city, covering an area within half a mile radius of the port limits.

Since 1935, particular attention has been devoted to the problem of malaria in and around old and new Delhi, where the incidence of the disease has given considerable cause for anxiety during recent years. The Central Government have now inaugurated an extensive programme of temporary and permanent antimalarial measures directed towards the effective control and, if possible, the elimination of malaria, in order that the Imperial Capital may, apart from the benefits conferred on the local inhabitants, serve as an example to the rest of India in regard to the practical application of scientific knowledge. The following summary of the antimalarial operations in Delhi has been supplied by the Director of the Malaria Survey of India :—

"An antimalaria campaign throughout the Delhi urban area, which is about 50 square miles in extent, was commenced in July, 1936, under the supervision of the Director, Malaria Survey of India. The policy adopted was to bring into effect temporary measures for the immediate control of mosquito breeding as rapidly as possible, and, at the same time, to prepare projects for necessary permament engineering works which would be executed as funds became available. A sum of Rs. 75,000 was allocated for temporary measures for the year 1936-37. Of this approximately Rs. 30,000 was absorbed on account of salaries of the superior staff leaving roughly Rs. 45,000 for expenditure on equipment, larvicides, pay of personnel, minor drainage works and contingencies. The chief factors favouring the prevalence of malaria in Delhi are—

1. Excessive canal irrigation, coupled with interference with natural drainage by railway, road and canal embankments in the North-Western Section.
2. Annual flooding of the Bela by the Jumna, leading to (*a*) heading up of water in the various storm-water drainage channels, and (*b*) formation of prolific breeding places as the flood recedes.
3. Presence of vast numbers of excavations throughout the area in the form of borrow-pits alongside railways and roads, and pits in brickfields and quarries in which water collects and affords dangerous mosquito breeding places.

4. Presence of domestic breeding places, under which may be classed water collections fed from hydrants, ornamental waters, non-mosquito proof cisterns and wells and the numerous defects in the underground storm water drainage system.

The following measures were carried out during the year :—

1. *Reorganisation of anti-malaria staffs employed in the various sections of the area.*—An arrangement was also made with the Central Public Works Department to place an overseer with the necessary staff directly under the Health Officer, New Delhi, for the purpose of dealing with minor engineering defects without delay.

2. *The provision of adequate legislative powers to deal with mosquito breeding on private property.*—The relevant sections of the Bombay Municipal Act were made applicable to Delhi Province. Under these provisions, owners, or occupiers of premises can be compelled to adopt measures to prevent mosquito breeding in such a manner and within such a period of time as the authorities may require. In default of this, powers are given for the work to be carried out at the expense of the person to whom the requisition was addressed.

3. *The institution of temporary anti-mosquito measures.*—These included the clearing of jungle, minor levelling and drainage works and the application of larvicides to breeding places. The larvicides used were chiefly fuel oil (mixed with 2½ per cent. of cresol) and paris green. Another measure which met with success was the spraying of dwellings with pyrethrum insecticide in order to destroy adult mosquitoes. A cheap and efficient anti-mosquito spray and an anti-mosquito pomade were made available at the Municipal offices. Addresses were given to the Municipal Committees of both Delhi City and New Delhi on local malaria problems and their control. In order to check the efficacy of the temporary control measures, catching stations were established at various spots throughout the area which were visited at regular intervals by insect-collectors working under the Assistant Director of the Malaria Survey of India, who acted as special anti-malaria officer for the whole area.

4. Whilst control measures of a temporary nature were carried out in the manner outlined above, conferences were held at various times with the Central Public Works Department, Irrigation and Railway Engineers and as the result of these a programme of permanent anti-malaria measures was submitted to the Government of India. Sanction for the expenditure of 14·79 lakhs of rupees during the year 1936-37 on the most important of these measures was given. "

It may be added here that the results so far obtained have justified the expenditure incurred on this anti-malaria campaign ; when the programme of permanent measures is completed, there is every reason to believe that the incidence of malaria in the two Delhi urban areas will fall to the irreducible minimum.

In addition to those substantial special allotments made by Government, further funds have been provided by the Indian Research Fund Association for control of the disease in certain rural areas of Delhi Province. A sum of Rs. 1,50,000, spread over a period of five years, has been sanctioned for work in the rural areas immediately adjoining the urban centres whilst an additional Rs. 50,000 has been provided for a five-year anti-malaria programme in the Najafgarh area in which a Health Unit organisation has been established. These two grants were made from the special Rs. 10 lakhs grant given in 1935-36 by the Government of India to the Indian Research Fund Association mainly for anti-malaria work. The balance of this special grant has been allotted as follows :—(*a*) 2 lakhs to Madras Presidency ; (*b*) 2 lakhs to the U. P.; (*c*) 1 lakh to Bengal, in each case on the conditions that an equivalent amount was sanctioned by the provincial Government and that the expenditure on approved schemes should be spread over a period of 5 years ; and (*d*) one lakh to the Assam Government for the Assam Medical Research Society, which is actively engaged in malarial research and which is supported financially by the provincial Government.

Quinine.

The question of malaria control in India is mainly a rural problem, because not only do 89 per cent. of the people live in rural villages, but the incidence of the disease in the villages is much higher than that ordinarily found among urban populations. In seven provinces for which rural and urban malaria deaths are separately available, the general rural death rate from malaria during the year under review was found to be 10·0 p. m., whilst the urban rate was 3·5 p. m. For individual provinces the difference between those rates was even greater. For example, in Bengal, the rural rate was 7·2 p. m. and the urban 0·6 p. m. Under these circumstances, it would seem that such funds as may be available should be devoted to campaigns for the relief of the village populations. On the other hand, as the Director of the Malaria Survey of India has remarked, " no satisfactory general method of bringing malaria under rapid and effective control in rural areas at a cost within the means of the people has been evolved in any malarious country in the world. India is no exception to this rule, and, whilst there are many examples of successful control of malaria in municipalities and cantonments and among labour forces employed on plantations, railways and other engineering works and by various industrial concerns, we cannot point to any instance of the successful control of village malaria except at a prohibitive cost ". The policy to be adopted must therefore be directed to such amelioration of conditions as may be practicable rather than to expensive methods of control and, with this end in view, every effort should in the first place be made to encourage the consumption of quinine.

Table N, appendix II, gives details of the quantities of quinine and cinchona febrifuge issued by public health, medical and other Governmental departments in the individual provinces during the year under review. In relation to the numbers of persons suffering from malaria, it is obvious that these quantities are totally inadequate to meet existing needs. The whole quinine question is so important that it has been considered desirable to reproduce more or less *in extenso* a memorandum on the subject which was prepared by the Public Health Commissioner for the inaugural meeting of the Central Advisory Board of Health held in Simla in June, 1937.

" The discovery and commercialisation of the cinchona plant make one of the most interesting stories associated with the development of modern medicine. For nearly two centuries after it became known that cinchona bark contained an active and valuable febrifuge, unbridled exploitation of the cinchona forests in South America went on until these enormous natural stores of the drug were in danger of becoming exhausted ".

" In order to combat the danger of scarcity of the bark, a Dutch expedition in 1852 and an English one in 1860 went to South America to obtain supplies of cinchona seeds and plants with the object of opening up cinchona plantations in Java and India. The British expedition succeeded in delivering in India over 450 live plants and 100,000 seeds of *C. succirubra* and the Dutch expedition achieved equally successful results. Within a few years by mutual exchange both countries possessed a number of different varieties of the cinchona plant and successful transplantation was followed by a period of experimentation and research in respect of the best methods for propagation of those species giving the higher percentages of quinine. Thanks to the determination of an Englishman and his Indian servant, a collection of seeds of *C. Ledgeriana*, which gives the highest percentage of quinine, was made available to both the Indian and Dutch Governments."

" Until this variety was successfully transplanted, the cultivation of cinchona both in India and in Java had shown little prospect of commercial success and it had been impossible to induce private companies to take part. In view, however, of the ready demand and the higher prices obtainable for ledgeriana bark, the position completely changed and private plantations were successfully developed not only in Java but also Ceylon and South India. By 1880, instead of a shortage, the supply of cinchona bark was considerably greater than the demand, and in the following years the price continued to fall until in 1895 it had reached a level below that of the cost of production. As a result, both in

Ceylon and South India the planters found themselves compelled to give up cinchona cultivation in favour of tea and the Dutch East Indies was left practically the sole producing country. For many years past Java has produced approximately 97 per cent. of the total world supplies, India being responsible for about 2·5 per cent. and other countries for the minute proportion of 0·5 per cent. That in brief is the history of cinchona cultivation since the discovery of the plant in South America".

"*The quinine question from a world economics point of view.*—It is obvious that production of quinine has not only a humanitarian aspect, but that it is also a world economics problem. From the humanitarian point of view it is desirable that every sufferer from malaria, even the poorest, should be able to obtain sufficient quinine for his needs. Available statistics make it possible to give an approximate estimate of the numbers of persons in the world infected with malaria. In 1925, the Malaria Commission of the Health Committee of the League of Nations estimated that no less than 26,000 tons or 58,240,000 lbs. of quinine would be required annually in order to provide 40 grains to every malaria case in the world. Present world consumption, according to recent reliable information, reaches a figure of only 600 tons or 1,344,000 lbs, although this total could be increased to 1,400 tons or 3,136,000 lbs. if present restriction of production was removed by the Java authorities. It must be remembered that millions of malaria patients are so poor that they cannot possibly afford to buy quinine even though the price was reduced to the cost of production. From the world economics point of view, the problem is two-fold; the supply of sufficient quinine at a price low enough to meet the needs of poverty-stricken malaria sufferers and, at the same time, the maintenance of quinine production on an economically sound basis".

"Every endeavour must be made to place the present large stocks of quinine at the disposal of malaria sufferers in an inexpensive and convenient way. This is a public health problem of the first importance. At the same time, until those interested in the control of malaria take into account the conditions that make quinine production economically possible, discussions on lower prices and larger production may well be of little avail. As has already been indicated, at the end of last century the principal cause of continued reductions in the price of cinchona bark was 'over-production', the supplies of bark greatly exceeding the demand, because of the lack of organised co-operation amongst the planter producers. On the other hand, because quinine manufacturers had already reached a sufficient degree of co-operation, they became the real masters of the cinchona market and had the power to fix prices as they chose. During 1910-1912, the price of bark again fell to such an extent and the Java producers were in such a critical position that they finally agreed to combine, and in 1913 their organisation came to an agreement with the quinine manufacturers which provided a basis of co-operation. This co-operation has been maintained by fresh agreements, the control and execution of which is entrusted to the Kina Bureau in Amsterdam".

"The Dutch authorities maintain that the Cinchona Agreement has never been used to force prices of quinine to an unreasonable level and quote, as an instance, the War Agreement made with the Allies under which the latter 'secured practically the whole year's production of Java quinine on reasonable terms', the price received being far below the market price at the time. The Government of the Netherlands East Indies, it is stated, 'has always adopted the standpoint that only a reasonably profitable industry can be the sound basis for a normal and constant production'. Proof that the Government desires to safeguard against any possible abuse is given, it is said, in Article 117 of the Cinchona Agreement, which was included because the Netherlands East Indies Government made it a condition of their signing the Agreement. This article reads: 'The Government of the Netherlands East Indies reserve the right to surrender membership of the Association at a year's notice if the Government are of opinion that the Cinchona Agreement forms an impediment for the supply of quinine to the malarial districts'. It must be remembered that the Netherlands East Indies Government are themselves owners of large cinchona plantations which produce about 10 per cent. of the entire supplies of Java bark".

"At different times, the Kina Bureau has also made contracts for the supply of cheap quinine with Albania, Bulgaria, Greece, Russia and Italy and has asked for the co-operation of the Protestant and Roman Catholic Missions to bring cheap quinine to malaria sufferers in China and the Belgian Congo."

"It is obvious, in the interest of the producers themselves, that consumption of quinine should be increased, such as can be induced by a systematic supply of cheap quinine to malaria infected regions. Dutch interests, it is said, 'cannot lie in a "trust" for forcing up prices but rather in the sale of as much quinine as possible at prices at which profitable cultivation can be permanently maintained."

"The final argument produced by the Dutch authorities is that without the Cinchona Agreement quinine would once more become a speculative article in the hands of middle men who would be much more interested in the supply of quinine to markets where the largest profits could be made rather than in supplying cheap quinine to impoverished sufferers from malaria. And the various Governments interested in quininisation of malarial regions, would not then have the assurance that they could regularly obtain adequate supplies of cheap quinine, a certainty which the Cinchona Agreement now furnishes".

"*The policy of the Government of India.*—After the introduction of cinchona in 1861 for many years the object was to manufacture from Indian grown cinchona a sufficient amount of cheap febrifuge to meet India's needs".

"Following the extensive development of cultivation in Java and increased demands in India, this ideal of self-sufficiency was abandoned except to the extent that in 1912, the Government of India decided to build up a reserve of 250,000 lbs. to provide for the contingency of a considerable increase in consumption and to guard against the possibility of an increase in world prices. In pursuance of this decision an agreement was made first with Messrs. Howards, Ltd., in 1919 and subsequently in 1921, with a Dutch combine for the supply mainly of bark. This agreement was terminated in 1928".

"As stocks held by the Government of India had fallen far below the figure of 250,000 lbs. owing to military requirements during the War, the purchase of bark from abroad under the above agreement was essential. Partly for this reason, but certainly in connection with the question of adopting a policy of industrial development, the ideal of making not only India but the British Empire self-sufficient by developing India's production of quinine was put in the forefront before the War ended. In order to give effect to this policy, the Government of India in 1917 placed Colonel Gage, the Director of the Botanical Survey of India, on special duty to explore the possibilities. As a result of his recommendations, plantations were started in Burma; those established in the Tavoy District were destroyed by heavy rains in 1921 and 1922 but, in 1923, the existing plantation in Mergui District was started".

"The ideal of Empire self-sufficiency lasted from 1918 to 1923. But in December 1923, after a conference of representatives of the Governments of India, Bengal and Madras assisted by public health experts, it was decided—

(*i*) that the Government of India's quinine policy should be directed towards supplying the official and trade requirements of the Indian market only. This was probably due to the financial position of the Central Government, for at that time, the Inchcape Committee had just surveyed the field of Central expenditure and had made drastic recommendations for economy. With regard to quinine, they recommended that the Central Government's stocks should not be allowed to rise above 271,000 lbs., the figure at which they stood at the time.

(*ii*) That the tripartite arrangements then in force for purposes of production, *viz.*, production by the Governments of India, Bengal and Madras, should not be disturbed, but the Central Government should regulate prices so as to ensure uniformity, as also the programme of cinchona cultivation and that so long as India was mainly dependent for her supplies on foreign sources, there should be no attempt to break away from world prices".

"In April 1928, the stock of quinine held by the Government of India had risen to 361,495 lbs. whilst the total annual official demand had dropped to 60,000 lbs. from the War figure of 80,000 lbs., notwithstanding a fall in the price of quinine from Rs. 30—35 to Rs. 18 per lb."

"Another conference of representatives of the Governments of India, Bengal and Madras, assisted by the Public Health Commissioner, was convened to review the situation. This conference advised that there was no practical prospect of the Government of India ever being able to capture the market in India and that the policy should be confined to supplying the official or Government demands for quinine for official institutions. They recommended that 250,000 lbs. be set apart as a permanent reserve against any grave malaria epidemic and that the balance of accumulated stocks be utilised for increasing the general consumption in India, an inducement being offered to the provinces to increase their consumption by the Government of India offering to sell quinine at the rate of Rs. 14 per lb. as against the usual price of Rs. 18. The conference also advised acceptance of the recommendation of the Royal Commission on Agriculture for the centralisation of the Cinchona Departments (paragraph 411 of the Report of the Royal Commission on Agriculture, 1928)".

" The modified ideal of official self-sufficiency was accepted, but the scheme for increasing sales of quinine to Local Governments received no support from these Governments on the plea of lack of funds. In view of their attitude and, as it was estimated that stocks by the end of 1928 would amount to 450,000 lbs., the Government of India decided to consult the Governments of Bengal and Madras before reaching any conclusion on the question of centralisation of the production of cinchona and quinine. The conclusion reached on the recommendations of the Royal Commission on Agriculture for more scientific investigation of cinchona cultivation and manufacture of quinine (paragraph 412) was that the only hope that this investigation will be undertaken lies in the formation of a strong Imperial Department ".

" The Governments of Bengal and Madras were addressed in August 1929, regarding the centralisation of the production of cinchona and quinine. The Government of Madras were agreeable to the proposal but the Government of Bengal opposed it urging, *inter alia*, that a definite decision should be postponed until the future constitution of the Central and Provincial Governments had been settled. These objections, added to the financial inability of the Government of India to spend Rs. 61,00,000 on the acquisition of the plantations of the two Local Governments, led the Government of India to decide in September 1931 against any action being taken on the Royal Commission's recommendations for centralisation ".

" Whilst the Government of India's policy so far had been to make India self-sufficient, by 1930, this objective was limited to one of satisfaction of official requirements. Two factors contributed to this decision :—

(*i*) Failure of the official demand to absorb the existing official output. This is obvious from Table II (and viii).

(*ii*) Absence of any power in the Government of India to compel Local Governments to increase consumption. Without this, the mere power to regulate prices and production, which the Devolution Rules had vested in the Government of India, has availed little to increase consumption ".

" In order to reduce the financial loss incurred by locking up capital in accumulated stocks, in 1932 another attempt was made to induce Local Governments to buy more quinine by offering it to them at the further reduced price of Rs. 12 per lb. for all quantities purchased over and above their existing average requirements. This offer elicited no better response than that made in 1928, but since then surplus stocks have been reduced chiefly by the free allotment of 45,000 lbs. in 1935-36 to provinces for free distribution ".

" Financial stringency and failure to increase provincial consumption compelled the Government of India to stop extensions in the Mergui plantations and to retain these only on a care and maintenance basis. Production merely to accumulate stocks could not be justified, especially as the Central Public Health Authorities had made the revised recommendation that a reserve of 150,000 lbs. would suffice for any national emergency ".

" The failure of past efforts to increase provincial consumption by price reduction even to Rs: 12 per lb. suggests that more substantial price reduction is the very essence of the problem. In 1932, the cost of production of Government of India quinine was estimated at Rs. 14·51 per lb. excluding overhead charges for direction and rent, whilst the quinine content of the cinchona bark from Mergui plantations is less than that of the Java bark. It is probable therefore that unless scientific research can improve the quinine content or new plantations elsewhere yield better results, the Government of India cannot hope to produce quinine at a cost which would induce Local Governments to buy more ".

" The preliminaries to action by the Government of India either to extend their own plantations or to promote research into methods of cinchona cultivation and quinine manufacture would seem to be :—

(*a*) to ascertain the true commercial cost of production both in Bengal and Madras and

(*b*) to enquire whether these two Governments will be prepared to treat the production of cinchona and its derivatives as a humanitarian activity rather than a source of profit.

Only when correct information on the first point is available, can it be decided whether the extension of plantations and the promotion of further research are likely to bear fruit. The information so far available indicates that production costs for Bengal are Rs. 10·02 per lb. for quinine and Rs. 9·77 for cinchona febrifuge. The figure given for Madras is Rs. 13-8-10 per lb., but this requires further elucidation before it can be accepted. If these rates on further examination prove to be substantially correct, it is for discussion

whether large expenditure on research directed to possible reduction of production costs would be justified. It is to be remembered that the Government of India no longer possess the power to regulate the production price of cinchona and its derivatives ".

" *Estimated needs and present consumption of cinchona derivatives in India.*—Although it may safely be stated that in India the present consumption of the cinchona alkaloids is totally inadequate for the needs of the people, it is not possible to do more than to make a rough approximation of the amount required. On several occasions the Public Health Commissioner's reports have stated that the potential demand for quinine lies between 125,000 lbs. and 1,500,000 lbs. per annum ".

" The number of individuals who suffer from malaria in India every year has been conservatively estimated at a minimum of 100,000,000. For the purposes of mass treatment the amount of quinine should be the minimum effective dose which will relieve symptoms. Taking this at 45 grains, a rough approximation of the annual quinine requirements for India would be 100,000,000 × 45 grains or approximately 600,000 lbs. "

" India's potential demand might also be calculated from the 15 grains *per capita* consumption in Italy and, on this basis, the requirements work out at approximately 700,000 lbs. per annum ".

" In the 1935 report of the Sub-Committee of the Colonial Advisory Council of Agriculture and Animal Health, it is estimated that 30 per cent. of the population in India suffer from malaria and require yearly some twenty-four million ounces of quinine, *i.e.*, 1,250,000 lbs. "

" From these different approximations it may perhaps be safely assumed that the potential annual demand in India lies somewhere between 600,000 and 1,500,000 lbs. of quinine ".

" As regards the present consumption of quinine, it is stated in the annual report of the Cinchona Plantations and Factory in Bengal, 1930-31, that ' the total consumption of quinine in India kept remarkably steady at about 211,000 lbs. per annum '. Tables II (*viii*) on page 59 and II (*ix*) below contain figures for (*a*) production and sales, and (*b*) imports of quinine salts during the past few years. From these it will be seen that the annual consumption figure has been remarkably steady at about 200,000 lbs. per annum, of which approximately 110,000 lbs. are imported and 90,000 lbs. are produced in India. Present consumption in India is therefore only about one-third of the lower figure for estimated requirements whilst it is less than one-sixth of the higher ".

TABLE II (*ix*).

Imports into India of quinine salts during 1931-32 to 1936-37.

Year.	Quantity.	Value.
	Lbs.	Rs.
1931-32	111,056	25,65,369
1932-33	102,660	26,34,493
1933-34	127,572	31,74,199
1934-35	107,628	25,89,966
1935-36	103,610	26,17,842
1936-37	99,049	23,19,610

N.B.—Imports are mainly by trade for private consumption.

TABLE II (*viii*).

Production and sales of quinine salts in India.

Year.	Government of India.		Government of Bengal.		Government of Madras.		Total.		Difference between columns 8 and 9.
	Production.	Sales.†	Production.	Sales.	Production.	Sales.	Production.	Sales.	
1	2	3	4	5	6	7	8	9	10
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
1928-29 . . .	10,465	12,774	37,077	15,066	18,056	27,832*	65,598	55,672	9,926
1929-30 . . .	3,110	12,314	42,776	13,260	22,891	29,009*	68,777	54,583	14,194
1930-31 . . .	5,959	19,987	37,678	13,685	20,880	24,355*	64,517	58,027	6,490
1931-32 . . .	1,536	16,952	44,029	14,450	19,875	21,563*	65,440	52,965	12,475
1932-33 . . .	3,981	11,368	44,052	13,246	23,784	18,290	71,817	42,904	28,913
1933-34 . . .	5,740	12,955	45,728	21,252	22,935	20,169	74,403	54,376	20,027
1934-35 . . .	3,224	32,284@	52,946	16,088	23,889	23,343	80,077	71,715	8,362
1935-36 . . .	4,199	37,822	48,391	20,033	25,402	34,384	77,992	92,239	—14,247
1936-37 . . .	12,032	41,419	49,935	25,843	35,369	39,863	97,336	107,125	—9,789

NOTE 1*.—In the years in which Madras sold more quinine than its production, the deficiency was made up by purchases from the Government of India stocks.

†The Government of India sales, which have been in excess of their production, have, to the extent of the difference, been made up of supplies from the surplus stock.

Note @.—Includes 10,000 lbs. sold to Ceylon Government and also sales to Carnegie Brothers and to the trade in India.

On an average 65,896 lbs. of bark were harvested annually from the Government of India cinchona plantation at Mergui. This quantity is equivalent to about 2,000 lbs. of quinine.

" *Costs of production and the possibility of effecting a reduction in price.*—Before discussing the question of the extension of cinchona cultivation in India, it is necessary to consider the position of the world quinine market. At the present time, total annual world-production is said to be about 1,344,000 lbs. The potential supply is, however, much in excess of this figure, as it is understood that Java could readily increase production to 1,400 tons or 3,136,000 lbs. per annum from existing sources. The economics of the situation deserves some notice. Two points appear to be prominent; (1) the extending cultivation of cinchona in Java, although production is meantime being deliberately restricted, and (2) the position of India and the rest of the British Empire which are largely dependent on a foreign source for supplies of quinine."

" The present selling price of quinine in India is about Rs. 18 per lb. whilst production costs, according to different reports, show wide variations. The world market is largely controlled by the Kina Bureau which, however, claims that quinine is sold at a price only allowing a ' fair profit ' to the producers."

" In the administrative report of the Madras Government Cinchona Department for the year 1935-36, it is argued that an agreement between the Government of India and the Local Governments is specially necessary in regard to a common issue price throughout India and that the only satisfactory method is to adopt the wholesale price ruling in the market. It was apparently on this understanding that a considerable sum of money was sunk in new plantations in Madras. The report goes on to state that ' there is not the slightest doubt that quinine will never be produced in South India as cheap as in Java. But in these days of economic nationalism it seems but right that India should not abandon the attempt to produce the required quantity of quinine without exhaustive investigation. In a later paragraph the Madras report states that the factory cost of production during 1935-36 was Rs. 13-8-10 a pound against the unusually low figure of Rs. 11-9-3 in the previous year ".

" In the 1935-36 report of the Government Cinchona Plantations and Factory in Bengal it is stated that :

' It appears from the trend of discussion in the legislatures and in the press that the public are not so conversant with all aspects of the quinine problem as to make its interest practically effective. Its usual demand has been for more and more and cheaper and cheaper quinine. It knows the remedy and it sees the ravages of malaria, but there are practical difficulties in the way of all attempts to bring quinine at low rates to the great mass of India's sufferers. The present high level of prices in cinchona production is essentially due to the difficulties of production. If the raw material were easy of production, the manufacture of sufficient supplies would be easy enough, but cinchona as a plant is exacting in its demand and it is not everywhere or under any set of conditions that it can be successfully exploited. Costs of production are high, competition is restricted by reason of the climatic and soil requirements of cinchona and these combined explain high world prices' ".

" The report goes on to say that ' the public demand for the lowering of quinine prices to India is obviously based on the fact that production costs here are lower than the level of world prices and Governments are therefore urged repeatedly not to make a profit. The difficulty, however, is that the volume of production in India is quite insufficient to meet more than a fraction of the home demand, giving the importer of quinine a virtual monopoly, and as long as this state continues so long will it be impossible for Government to reduce prices below market price without the risk of supplies going astray into the hands of profiteers. So far as the whole of India is concerned, relief can only come from such an extension of local production as would effectively compete with foreign quinine in meeting the total demand and thus maintain prices at a level commensurate with the cost of production at home.

" In the same report, production cost of cinchona bark and the cost of extraction, *i.e.*, the total cost per pound of quinine, is given as Rs. 6·548. The market rate for quinine during the year under review was Rs. 22, whilst the Government rate was still Rs. 18 and, at the latter figure, the quinine extracted gave a profit of over Rs. 5,50,000. The figures quoted in the above paragraphs indicate that there is a good margin between cost of production and world prices and that there exists a distinct possibility of producing cheaper supplies."

"*The possibilities of extension of cinchona cultivation in India.*—The Royal Commission on Agriculture remarked that 'if India is to embark on any large campaign of fighting malaria, we are convinced that it will be necessary to reduce considerably the price of quinine within India and this can only be affected if India is self-supporting in production. To achieve this self-sufficiency, a considerable extension of the present area of cinchona will be required ".

" Various authorities including the Colonial Advisory Council of Agriculture in London have since had the same question under consideration. The latter body, for example, has suggested the desirability of further experimentation in suitable areas both in East and in West Africa where the cultivation of cinchona has already been shown to be possible. Experience in India has proved that cinchona can be successfully cultivated in selected areas and that India possesses the necessary conditions for production of cinchona to enable her to compete with other producers. In other words, if competition can reduce prices India is in a strong position to develop that competition. It seems, therefore, that attempts should be made to extend cinchona cultivation in India in order to satisfy the quinine requirements of the country and to avoid the necessity of depending on a foreign country for supplies. In order to ensure success, however, numerous factors must be taken into account. In India, the factor of first importance is suitability of land and climate. The extent and accessibility of areas suitable in these respects, selection of species of cinchona, economy of management and availability and cost of labour are other questions demanding consideration. Organisation for distribution, assuming the cost to Government of distribution is part of the cost of production, also requires attention. Finally, the harvest of bark is not available until the plantation is from 8 to 15 years old. These are all serious deterrents to private enterprise. In view of the previous disastrous failure of private enterprise in Ceylon and South India and of the risks involved, it is certain that Government would have to assume responsibility both for the scientific control and for the expenditure required."

" The Bengal Cinchona Department's report for 1935-36 contains relevant remarks on this subject, which may be quoted :

' It is fortunate, that in India areas exist fairly suitable to the cinchona plant and experience has shown that it can be cultivated here at costs which would allow of a cheapening of quinine for the masses. When finance is forthcoming there is no reason why a forward cinchona policy should not be adopted with every prospect of success. Experimental cultivation could be started under suitable conditions in different parts of the country and all the accumulated experience of the existing cinchona organisations in India would be available to draw upon. But the success of such effort, if it is to be truly national, would seem to depend on a co-ordination of all the provincial efforts. Only certain provinces in India, however, are fortunate in having suitable areas, and with the inauguration of provincial autonomy under the new constitution it would seem that the Central Government alone could bear the responsibility of such a national policy, so that the less fortunate provinces also may benefit. For, under the present economic conditions, it is not likely nor is it reasonable to ask that those provinces which can produce should make revenue sacrifices in the interest of others. This was probably one of the reasons why the Royal Commission on Agriculture stressed the importance of cinchona as a national problem ' ".

" The report goes on to say :

" The discovery of land and local climatic conditions more suitable to any or all of our species and varieties of cinchona would go some way to a reduction of costs, and such discovery is the first thing necessary towards that development of production that must precede any safe reduction of price. This was recognised when my predecessor, Coonel Gage, toured to find suitable areas. Costs in Burma have been higher than in the Eastern Himalaya and higher than what I believe they would be in the Eastern Himalaya lying between Sikkim and Northern Assam. Experience in the Sikkim Himalaya suggests that if there is to be any centralisation and co-ordination of Indian effort in future, the way towards this is by the examination and experimental proof of a number of selected areas in this Eastern Himalaya sub-alpine tract."

" The Government of India have recently sanctioned an investigation in regard to the areas in India which would be suitable for cinchona cultivation and the cost of cultivation in those areas. This investigation is now being carried out by an experienced officer, who was for many years in charge of the cinchona plantations in Madras Presidency."

"*The possibility of effecting mass treatment with cinchona alkaloids in India.*—Experts all over the world have repeatedly stressed the importance of providing cheap and adequate treatment for the malaria sick as the first step in any anti-malarial campaign."

It has nowhere been proved that the eradication of malaria can be effected by the use of drugs alone. Although, however, the provision of treatment is merely a palliative measure, nevertheless it is an effective method of reducing morbidity and mortality and consequently of diminishing the serious economic losses arising from the disease. Experience in many countries has clearly shown that mass quininisation is of great benefit and there can be no doubt that an efficient campaign ensuring adequate treatment to the malaria-ridden people of India would have enormously beneficial results."

"As regards the choice of suitable drugs, at the present time the cinchona alkaloids have many advantages, the most important being that they can effect a clinical cure, they can be distributed and used without medical supervision and they are as cheap as, or cheaper than, any other anti-malarial drugs. The question remains as to the form in which cinchona alkaloids can be employed so as to ensure the greatest benefit to the greatest number for the money available. Three forms are available, *viz.*, quinine, cinchona febrifuge and totaquina."

"Quinine and its salts have a high therapeutic value but their cost prohibits their general use. Cinchona febbrifuge as originally prepared in India was a mixture of the total alkaloids from the bark of *C. succirubra*. The present febrifuge has approximately the same composition though its method of preparation is somewhat different. The term 'totaquina' is applied to a standardised cinchona febrifuge prepared according to suggestions made by the Malaria Commission of the League of Nations."

"In the opinion of many malaria experts, cinchona febrifuge and totaquina are almost as effective as quinine for mass treatment purposes; moreover, they can usually be produced at a lower cost. The possibility that increased demands for cinchona febrifuge would result in a rise in price to approximately that of quinine is a matter which, however, deserves mention. Following a report by the Madras Commission in 1866, that the other alkaloids were as efficacious as quinine in the treatment of malaria, a rapid rise in the price of the former occurred. Apart from changes in relative costs, however, it seems that at present the drug of choice for mass treatment in India is an improved cinchona ferbrifuge and to satisfy this requirement additional and cheaper supplies of cinchona and its derivatives are urgently necessary."

"*Means for popularisation of quinine in India.*—In considering this question it must be remembered that it is necessary not only to educate the people in regard to the value of the drug but to evolve cheap and effective methods for its distribution."

"A properly organised selling and advertising campaign extended to the remotest parts of the country should go far to meet both these objectives and adoption of a plan for general quininisation of school children with febrifuge would assist in the same directions."

"One of the chief obstacles to effecting a wide dissemination of anti-malarial drugs is in organising a suitable agency for distribution. Existing agencies for distribution include post offices, public health departments and voluntary organisations. As regards the first, the preparation and distribution of the post office packets is an expensive procedure, since the selling price of quinine in this form is approximately Rs. 27 per lb., or almost double the cost of production and manufacture. Presumably the cost of distributing febrifuge through post offices would be equally high, so that this method would largely nullify the benefit expected from the adoption of a cheaper drug. If extension of cinchona cultivation is to be undertaken, during the ten-year period in which additional supplies are being raised, every effort should be directed to the formulation of means whereby cheaper methods of distribution can be effected. In any such scheme, the machinery of distribution of quinine, given free or sold at a price below trade prices, must be so devised and controlled as to prevent profiteering by private concerns or, for that matter, any concern to which the quinine may be supplied at concession rates."

"During recent years a great deal has been done by various provincial Public Health Departments in the way of propaganda, with or without free distribution of quinine and this has been of considerable value. It should be possible to obtain from Local Governments information as to the methods which were adopted in distributing the supplies of free quinine donated to them in 1935-36 by the Government of India. Information as to difficulties experienced in making satisfactory arrangements and methods found successful would be of value in formulating an effective procedure. Apart from free distribution

the greatest difficulty, of course, has been to place the drug at the disposal of the villager at a price which he can afford to pay. Propaganda meant to induce him to use either post office packets or 'treatments' issued in other ways must largely fail if the drug is beyond his financial resources. The question of price is therefore intimately associated with that of propaganda campaigns and they cannot be considered separately."

"It might be possible to do more in the way of distribution of treatments through the agency of voluntary or other lay organisations, either separately or in association with official organisations".

"The preceding paragraphs will have indicated that the question of the provision of adequate treatment for the malarious sick in India is both wide and complex. It embraces such issues as the advisability of extending cinchona cultivation, the most suitable species to be grown, the selection of areas suitable for their growth, economic repercussions arising from an extension programme, financial considerations, rights under the new constitution, organisation for the distribution of drugs and probably others that have not been mentioned. The question is one in which every province and State in India is intimately and gravely concerned."

Effective control intended to prevent the sale of adulterated quinine is also a question of considerable importance. The replies received to a reference made to provincial Directors of Public Health and Administrative Medical Officers have indicated that in certain parts of the countries so-called "quinine tablets", which contain little or no quinine, are being placed on the market. In one province at least, a number of firms have been issuing for sale tablets which, on analysis, were found to consist of a mixture of chalk and gum, with mere traces of quinine and its allied alkaloids. In another province, five grain tablets obtained from eleven post offices showed, on analysis, a quinine content ranging between 2·41 and 4·01 grains. At the same time, it is only fair to add that the quinine tablets issued by reputable Indian firms were found on analysis to be genuine.

It is unfortunately not possible at present to measure the extent to which adulterated quinine is being marketed, because no province possesses a systematic agency for the sampling and testing of drugs offered for sale. It is true that certain provisions for the control of drug adulteration are contained in certain Municipal Acts and that some sections of the Indian Penal Code also make this offence punishable. As was pointed out by the Drugs Enquiry Committee in 1931, however, "the lack of definite standards and tests, the want of skilled experts and the absence of well-equipped laboratories and the requisite facilities to work them have stood as insuperable barriers" in the way of a comprehensive system of control. The whole question of adulteration of drugs requires far more attention in this country than it has hitherto received and it is to be hoped that provincial Governments will shortly see their way to take the legislative steps necessary to obtain full control.

Dysentery and Diarrhoea.

19. Dysentery and diarrhoea during 1936 were together responsible for a much larger mortality than cholera, the latter numbering 159,720 whilst those recorded under dysentery and diarrhoea totalled 281,666. For the decennium 1927-36, the average annual cholera mortality amounted to 222,181, the corresponding figure for dysentery and diarrhoea being 249,983; these three bowel diseases, therefore, constituted about 7·5 per cent. of the mortality from all causes during the past decade. An unknown figure for the enteric fever group remains to be added in order to assess the importance of the group of "bowel infections" in relation to other causes of mortality, so that it may safely be assumed that this whole group amounts at least to eight or nine per cent. of the total recorded deaths in British India.

Deaths from "dysentery and diarrhoea" for British India and the individual provinces and their seasonal distributions are given in tables J and K, Appendix II; urban and rural mortality rates are also given in table J. The largest number was recorded during the third quarter of the year and the lowest figure during the first quarter. The peak incidence corresponded with the monsoon period and the lowest incidence with the driest part of the year. Contamination of water supplies during the monsoon period probably constitutes an important factor in respect of increased prevalence of these diseases.

The general urban mortality rate was 2·1 p. m. and the rural rate 0·9 p. m. and a similar higher incidence in the former was recorded in every province except Bombay. Marked differences occurred in some cases; for instance, in Madras Presidency, the urban rate was 4·2 p. m. as compared with a rural figure of 1·6 p. m. The causes underlying these differences and the definitely higher incidences in urban areas would seem to require investigation.

Although hospital admissions cannot be accepted as representative of the incidence of a given disease in the general population, the following figures for cases of amoebic and for bacillary dysentery treated in medical institutions give some clue to the relative prevalence of the two forms of this disease.

Enteric Fevers.

Cases treated in hospitals and dispensaries during 1936.

Province.	Amoebic dysentery.	Bacillary dysentery.
N. W. F. P.	8,659	20,206
Punjab	87,834	99,033
U. P.	94,853	61,891
Bihar	82,268	39,303
Orissa	23,286	7,069
Bengal	209,520	29,968
C. P.	37,481	28,784
Bombay	40,690	18,393
Sind	11,792	3,788
Madras	200,417	102,215
Coorg	5,050	1,880
Assam	27,281	17,903
Burma	21,699	10,766
Baluchistan	303	1,992

Enteric Fevers.

20. Although it is probable that enteric infections in India are annually responsible for a heavy morbidity and mortality the recorded figures give little idea of their actual incidence. Even in the larger towns facilities for bacteriological diagnosis are not always available, whilst in the rural tracts few cases

are ever even seen by a medical practitioner. The result is that a large proportion of the deaths from this group of diseases are ordinarily included under the general heading "fevers".

During 1936, Delhi province recorded 288 deaths from enteric fevers. Of these, as many as 280 were registered in Delhi city; five were registered in New Delhi and three in the Notified Area Civil Lines. In the Chief Health Officer's opinion, only the figures for the last two areas were reasonably correct. Other provincial figures were Punjab, 6,512 deaths; U. P., 9,911, C. P., 3,312; Bombay, 6,311; and Sind 416 deaths.

Respiratory diseases.

21. Recorded deaths from respiratory diseases totalled 493,441 during 1936 against 482,870 in 1935, the rates being 1·8 p.m. and 1·7 p.m. respectively. The former figures represented 7·7 per cent of the total mortality for the year, during the decennium ending with 1936 the corresponding figure was 6·7 per cent. Figures and rates for British India and for individual provinces are given in Table L, Appendix II, and monthly distributions in table M. In the provinces the respiratory diseases death rate varied from 0·1 p.m. in Bihar to 5·8 p.m. in Bombay; the Punjab, Delhi, C. P., Bombay, Sind, Madras and Ajmer-Merwara recorded rates higher than that for British India. Whilst figures for the two sexes showed little variation, the differences between urban and rural areas both for individual provinces and for British India as a whole were striking. Urban rates invariably exceeded those recorded in rural areas. In the U. P., for instance, the former was 6·1 p.m. and the latter 0·2 p.m. as compared with 5·9 p.m. and 1·3 p.m. for British India as a whole. In Ajmer-Merwara the urban rate reached the high figure of 13·0 p.m.

Apart from errors in registration, the relatively high urban mortality from respiratory diseases must be associated with congestion, overcrowding and general insanitary conditions. For example, Madras city with a mortality figure of 11·9 p.m. recorded much the highest rate of any town in the Presidency, whilst the provincial rate was as low as 2·1 p.m. Similarly, in Bengal, in the city of Calcutta the death rate was 8·9 p.m. as compared with the provincial rate of 1·9 p.m.

Generally speaking the highest incidence for respiratory diseases was recorded during the cold weather between December and March, the minimum occurring in a majority of the provinces during June and July, but being delayed in some others until September.

Present methods for the registration of vital statistics in India make it impossible to attempt more than a classification of the causes of death into large groups such as 'fevers' and 'respiratory diseases'.

From the epidemiological and preventive points of view, however, some disentanglement of these heterogeneous groups is essential, if medical officers of health are to be in a position to formulate methods for reduction of the incidence of preventible disease. Whilst investigation in the rural areas presents many difficulties, much might be done in urban areas, and particularly in the larger cities, to obtain more accurate and detailed registration of causes of death. In some areas, a system of medical registration might be attempted by enlisting the cooperation of the local medical practitioners and by utilising the services of medical officers in charge of dispensaries and hospitals. In

some, and in other towns, the health staffs might reasonably be given the duty of enquiring into the cause of death and of reporting to the health officer the results of their enquiries. In an earlier part of this report, mention has been made of the handicap to health progress which obtains in most parts of the country from defective registration and, in view of the necessity for more reliable information, it is to be hoped that health officers will make every effort in their power to improve the vital statistics of the areas for which they are responsible.

Pneumonia.

22. Of the whole group of respiratory diseases, none causes as high a mortality as pneumonia. In the Punjab for example, this disease was responsible for 25,547 deaths or nearly 44 per cent of those recorded as due to respiratory diseases. As regards Bengal, the D. P. H. states that :—

"Since 1923, this disease has been steadily on the increase taking larger tolls of life every year. During the year under report, there was an increase of mortality from it both in the rural and the urban areas including Calcutta. In the whole province, the death rate increased by 16·7 per cent, in the rural areas by 18 per cent, in the urban areas by 13·4 per cent and in Calcutta by 16 per cent."

The Madras Public Health Report gives for 15 municipalities figures for the deaths from respiratory diseases, divided into three groups, *viz.*, tuberculosis of the lungs, pneumonia and others ; these have also been classified according to age at death. These municipalities had a total population of 1,152,231 at the 1931 census, and the rates have been calculated on census populations at the respective age-periods, so that they are comparable among themselves, if it be assumed that the different age groups have not undergone any great variation during the past five years.

TABLE II (*xi*)

	Deaths				Population 1931	Rates per mille of population			
	T.B. Lungs.	Pneumonia.	Other respiratory diseases.	Total.		T.B. Lungs.	Pneumonia.	Other respiratory diseases.	Total.
Under 1 year	...	345	667	1,012	27,045	...	12·7	24·7	37·4
1—5 years	6	688	719	1,413	122,037	0·05	5·6	5·9	11·6
5—10 years	4	292	63	359	134,823	0·03	2·2	0·5	2·7
10—15 years	38	155	12	205	127,112	0·03	1·2	0·09	1·6
15—20 years	213	148	9	370	115,008	1·9	1·3	0·08	3·2
20—30 years	709	343	36	1,088	222,205	3·2	1·5	0·2	4·9
30—40 years	601	272	56	929	169,934	3·5	1·6	0·3	5·5
40—50 years	438	221	73	732	114,986	3·8	1·9	0·6	6·4
50—60 years	310	199	106	615	69,755	4·4	2·9	1·5	8·8
60 years and upward	120	87	122	329	49,326	2·4	1·8	2·5	6·7
Total	2,439	2,750	1,863	7,052	1,152,231	2·1	2·4	1·6	6·1

It will be noted that the deaths from pneumonia amount approximately to 39 per cent. of the total. A striking feature is the high mortality recorded in the age groups 0—1 and 1—5 years both for pneumonia and "other respiratory diseases". For both, the lowest incidences are to be found in the adolescent age group, 10—20 years. On the other hand, the tuberculosis death rate is low for the age groups 0—10 years, but steadily increases during succeeding age periods, a slight reduction occurring among those over 60 years of age.

As regards the figures for pneumonia, the high incidence rates in infants and young children suggest that broncho-pneumonia is probably the main cause of death at those ages, since young children are more prone to this form of the disease than acute lobar pneumonia. Although figures for these 15 municipalities are not separately available, a classification of pneumonia deaths in 1936 given by the Health Officer of Madras city is of interest. His figures which indicate that broncho-pneumonia was the cause of death in at least 73 per cent. of the total pneumonia mortality, are as follows :—

Broncho-pneumonia	4,116
Lobar-pneumonia	183
Pneumonia (not otherwise defined)	1,331
Total .	5,630

As in the case of general respiratory diseases, urban rates for pneumonia were in every province higher than those in rural areas.

Tuberculosis.

23. In discussing some of the more important epidemiological features of tuberculosis in India, stress was laid in last year's report on the urgent necessity for carrying out detailed tuberculosis surveys in different parts of the country, so that more exact information as to the incidence and methods of spread of the disease might be made available. Whilst strong evidence exists to prove that tuberculosis, particularly of the pulmonary type, has markedly increased within recent years in certain areas, more detailed knowledge is required concerning the nature and extent of the infection and the special predisposing etiological factors which influence its spread in different communities. For example, it has been estimated by tuberculosis workers in Bengal that, in that province, about 100,000 people die every year of this disease. On the assumption that for every death there are ten cases of the disease, Bengal alone has one million persons infected with tuberculosis. These are alarming figures, but they are only estimates and it is more than desirable that accurate information should be available. This can only be obtained by making detailed surveys of sample groups of the population.

With this end in view, the Indian Research Fund Association, which has consistently financed tuberculosis research, appointed in 1936 a sub-committee to draft schemes for the conducting of tuberculosis surveys. This Committee's report was presented to the Research Workers' Conference held in December, 1937, and after discussion was unanimously adopted. The report has now been circulated to all provincial medical and public health administrations and to others interested in the question and should provide a useful guide to all medical officers concerned with the tuberculosis problem in this country. The Committee stressed the importance of detailed investigations in the following terms :—

A multiplicity of interacting causes tend to change the complexion of the tuberculosis probelm in a community. The problem varies greatly in urban and rural communities and among different social groups, between small towns and large cities in various parts of the country, and in industrial areas, as also according to the nature of the industry. A survey is intended not only to find out the incidence of infection, disease and mortality in a particular area and the factors which influence the spread of the disease in India under different conditions, but also to determine their relative importance to the problem, so that a correct perspective of the tuberculosis problem is obtained. It would be worth while to know in what way the incidence

and the type of disease prevalent in India vary from those in other countries and whether the same methods of treatment and anti-tuberculosis measures are applicable here as in Europe. A survey will also indicate the location, nature and number of anti-tuberculosis institutions that may be needed to cope with the situation. The survey, therefore, should come first in order to find out what the tuberculosis situation in a particular community is. The nature and extent of the survey will, of course, depend upon the object in view.

The Committee's report includes detailed schemes for three different types of survey, but in each case these have been drawn up so that the information collected will be on a comparable basis, whether the survey is carried out by official medical and public health departments or by voluntary or other agencies. The report also places importance on the necessity for expert supervision of these surveys either by a committee or by a special tuberculosis officer, in order that the data may be collected in accordance with accepted schedules and in a form suitable for subsequent statistical evaluation. It is hoped that this report will be used by all medical and public health authorities in the country and that the schemes laid down by the committee will be generally accepted as a basis for the carrying out of all future tuberculosis surveys.

In last year's report it was remarked that India had not yet planned a national campaign against tuberculosis, although a number of tuberculosis associations were at work in different areas. Since then H. E. Lady Linlithgow has launched an appeal on behalf of "The King Emperor's Fund" for tuberculosis work and it is hoped that this will receive the generous support of everyone interested in the welfare of India's people.

There is no question that ample funds will be required if the tuberculosis situation is to be adequately met. The most urgent need is the provision all over the country of a chain of tuberculosis clinics where skilled treatment and advice can be obtained from trained staffs of medical officers, nurses and home visitors. The main function of these clinics will be to get into touch with all tuberculosis patients and their families, to encourage suspected cases and contacts to come to the clinics for examination and advice and to arrange for the treatment both for early cases and for those requiring admission to a hospital or other institution. Although, in western countries, the tendency in recent years has been to leave treatment even of early cases to other agencies, it is probable that, in India, the clinics will be compelled, as far as they are able, to exercise this function because of the lack of other facilities. The work done by the staff of these clinics will not only throw light on the incidence of the disease, but will be of incalculable benefit to the whole population by inculcating hygienic methods of living among the patients and their relatives and neighbours. Whilst the present attitude of the people to preventive medicine is generally one of apathy, the grave danger of tuberculosis is becoming more generally recognised and it is certain that the part to be played by these tuberculosis clinics in eliciting active cooperation and assistance is one which cannot be under-estimated. These clinics are indeed the foundation of all anti-tuberculosis work and steps are now being taken to ensure an adequate supply of trained personnel, both medical officers and home visitors, for the additional clinics which will shortly be opened.

Existing accommodation in India in the form of hospitals and sanatoria for tuberculosis cases is very inadequate, the estimated number of available beds being only something like two thousand. In Europe and America, standards suggested for the provision of beds are based on the annual numbers of tuberculosis deaths. In the United States of America, for example two beds are demanded per death, whilst in Denmark in 1928, 137 beds were

provided per 100 deaths and 75 per cent. of all tuberculosis deaths took place in hospital. In England although the provision is not so high as in Denmark, approximately one bed per tuberculosis death is available. These figures have only to be quoted to indicate how backward India is in this respect. Moreover, it is well recognised that the segregation in hospital of advanced cases is one of the most effective methods of prevention, because of the wide dissemination of infection which takes place when these patients are allowed to remain in their own homes. Although it is obvious that this country cannot possibly afford to provide hospital beds for all its tuberculosis cases, nevertheless there is urgent need for a much larger number than is at present available.

The tuberculosis colony is a further stage in the development of social services for tuberculosis cases. As patients and their families may have to reside in these colonies for years or even for the rest of their lives, the social and religious prejudices of the people are likely to deter to some extent the general adoption of this system in India. With modifications suited to the country, however, the tuberculosis colony should be possible of successful development and it is one of the parts of the general anti-tuberculosis campaign which should not be forgotten, especially when it is remembered that one is already in existence in association with the Madanappallee sanatorium in Madras Presidency.

No national effort against tuberculosis can be effective without the fullest cooperation between all concerned, and provincial Governments, local authorities and voluntary agencies all have important parts to play in the campaign. At the same time, the initial driving force must come from an enlightened public opinion and it has become clear within recent years that large numbers of the general population have already realised the danger arising from the rapid spread of this infection. The work of voluntary agencies has been largely responsible for the development of this public opinion, particularly in large cities like Calcutta. For example, the Bengal Tuberculosis Association, which started work in 1929, has already a remarkable record of progress. It began by opening dispensaries or clinics for the purpose of " demonstrating to the public the practicability of a scheme of preventive and anti-tuberculosis work in India." With help from medical men who gave their free services and by the active work of health visitors, particularly in the homes of the people, the Association has gone far to organise a successful scheme in Calcutta although its work is not confined to that city. During the first year of the association's activities, the patients examined numbered 2,079, of which 648 were new cases ; in 1936, the numbers examined amounted to approximately 65,000 and new cases reached a total of nearly 9,000. In 1929, the work was in one clinic; to-day eight clinics are in existence, six of these being in and around Calcutta. In spite of this increased activity, however, the Bengal Tuberculosis Association has been able to touch only the fringe of the problem in that province and large additional funds will be required before the campaign can be extended to every part of the province. In any case, the foundations of a sound anti-tuberculosis campaign have been laid and the example set by this and other voluntary agencies should be sufficient to induce others to take up similar work in parts of India where so far nothing has been done. The need is great, the workers are few, but with patient endeavour the fight against this insidious foe can still be won.

It will be noted that the paragraphs dealing with provincial figures, which have found a place in previous reports, have been omitted on this occasion.

Available statistics are so inadequate that their publication can only give an erroneous conception of the actual situation.

Epidemic Dropsy.

24. The aetiology and epidemiology of epidemic dropsy have been the subject of extensive investigation during the past fifteen or sixteen years at the School of Tropical Medicine at Calcutta and more recently at the All-India Institute of Hygiene and Public Health. Various theories have been promulgated as regards the causation of the disease. Some hold that it is due to an infection carried through damaged rice stored under damp conditions; others consider it to be a contact-infection; and still others maintain that abnormal mustard oil is the causative agent. In regard to the first of these theories, evidence has been produced to show that the organisms associated with rice belong to the class of aerobic soil bacteria whilst, with respect to the second and third, no specific infective agent has so far been isolated. Work carried out at the Tropical School has supported the rice theory, but it has more recently been claimed by workers at the Institute of Hygiene that it has been possible to produce mild human cases of the disease by the administration of suspected mustard oil obtained from an area experiencing an outbreak of epidemic dropsy. Final proof has, however, not yet been obtained and further investigations are in progress. This disease is of considerable importance to north-eastern India particularly to Bihar, Orissa, Bengal, Assam and parts of the U. P. A note worthy feature is that it reaches its maximum incidence amongst members of the Bengalee community, although cases have been also reported amongst Telugu, Chinese and Siamese labourers in Burma.

Ankylostomiasis.

25. The anti-hookworm campaign which has been largely organised all over the world by the Rockefeller Foundation has a two-fold purpose. In the first place, eradication of the parasite from heavily infected persons not only produces marked improvement in health, but provides a striking demonstration of the value of public health measures in general. Secondly, a successful ankylostomiasis campaign eliminates or greatly diminishes the chances of soil pollution and the new hygienic habits instilled into the people make for ready acceptance of a wider programme of public health improvement. The organisation of anti-hookworm work constitutes, therefore, an important preliminary step in attempting to awaken interest in public health measures, particularly when dealing with communities among whom sanitation is of a comparatively primitive type.

The Rockefeller Foundation carried out an extensive campaign in Madras Presidency over a period of about seven and a half years and, from the beginning of 1928, the provincial government took over the work and made it an integral part of their public health organisation. Investigations carried out in different parts of the province showed that the general rate of infestation was about 70 per cent; in certain localities 100 per cent. of the population was infected, although in other areas the rate was very low. The general preventive campaign included mass treatment and education of the people by lectures, talks and practical demonstrations, whilst continuous efforts were made to provide the rural population with cheap types of latrine and to encourage them to use these. Various experiments were carried out in order to obtain a latrine which was both efficient and easy to construct and maintain

and for suitable soils the bore-hole type was found to be eminently satisfactory. Large numbers of this type of latrine have been constructed in different districts of Madras Presidency and some idea of the extent of the campaign in this province may be formed from the fact that the government allotted during 1936 a sum of 2·65 lakhs, from the Government of India grant for rural reconstruction, for the provision of village bore-hole latrines. In addition, local authorities reported that 179,652 anti-hookworm treatments, 11,158 lectures, 4,164 magic lantern demonstrations and 278 cinema shows were given, whilst they also participated in 190 exhibitions planned to extend knowledge of the disease. As part of the general preventive campaign, six rural sanitation units are maintained by the public health department, these being available to district boards desiring to organise rural sanitation work.

Few health officers will deny that there is urgent need for similar campaigns all over the country. Apart from the question of prevention of hookworm, soil sanitation plays an important part in the control of bowel diseases such as cholera, dysentery and diarrhœa. Moreover, areas now assumed to be relatively free from hook-worm might on investigation be found to reveal unexpected degrees of prevalence. For example, the D. P. H. Punjab, in his 1936 report remarks that ;—

"up to three years ago it was believed that hook-worm disease was not sufficiently prevalent in the Punjab to constitute a public health problem. Since July, 1934, systematic survey in 15 districts has shown that the disease is much more widespread than was formerly imagined and that a large proportion of individuals examined are infected."

Eight of the 15 districts surveyed showed rates of infestation higher than 65 per cent., the maximum rate recorded being 87·5 per cent.; eleven districts showed rates above 50 per cent. The D. P. H. adds that :—

"Hook-worm disease, it would appear, is responsible for a great deal of ill-health, which was formerly attributed to other causes, particularly malaria, since a prominent clinical feature of both these diseases is severe anæmia."

It would seem more than desirable for public health departments to devote serious attention to this question. In order to give some idea, although by no means accurate, of the prevalence of hook-worm disease in different provinces, the following figures for cases treated in medical institutions during 1935 and 1936 have been taken from provincial reports.

TABLE II(*xii*).

	1935		1936	
	Cases.	Rate per 10,000.	Cases.	Rate per 10,000.
Total	233,708	30	213,359	30
N.-W. F. P.	861	4	871	4
Punjab	3,866	3	3,821	3
Delhi	69	1	68	0·6
U. P.	3,066	3	3,976	5
Bihar	28,847	40	28,312	54
Orissa			3,063	18
Bengal	15,664	15	14,142	17
C. P.	3,908	11	2,447	7
Bombay	7,114	18	6,505	23
Sind			60	0·1
Madras	162,956	91	142,780	86
Coorg	2,928	91	3,335	104
Assam	2,790	11	2,256	10
Burma	1,615	5	1,703	5
Baluchistan	24	0·3	20	0·3

Filariasis.

26. Filariasis is widely prevalent in certain parts of India, particularly where a hot and humid atmosphere facilitates breeding of the transmitting types of mosquito and transmission of infection. The prevalence of two varieties of micro-filaria has been noted, *viz.*, *W. bancrofti* and *Micro-filaria malayi*. The latter was first discovered in the Dutch East Indies about ten years ago, but has since been shown to be present in scattered areas in different parts of India. Infection with *Micro-filaria malayi* has been recorded in Travancore in Balasore, in Patnagarh and in East Bengal.

Much of the research on filariasis has been carried out at the Calcutta School of Tropical Medicine, but individual workers have also investigated the problem in Travancore, Orissa and elsewhere. The distribution of filarial infection in India has been the subject of much study. In 1927, Megaw and Gupta mapped this out on the basis of replies made to a questionnaire issued to medical officers all over the country and a modification of this map was published by Acton and Sundar Rao in 1931. Since then systematic surveys, based on studies of thick smears taken at night from persons in endemic and non-endemic areas, have been carried out by Rao. The following brief description, based on an article by Rao published in 1937, gives some idea of the extent and degree of infection in the affected areas.

Bengal is the most heavily infected province in this country. The western districts of Midnapore, Howrah, Bankura, Burdwan, Birbhum and Murshidabad have high micro-filaria rates ranging from about 12 to 15 per cent.; the Central districts of Dinajpore, Rangpur, Rajshahi, Malda and Bogra record rates between 6 and 11 per cent.; whilst the districts of East Bengal, Dacca, Mymensingh, Pabna, Nadia, Jessore, Faridpore, Khulna, Bakargunj and Chittagong have rates below five per cent. The hill districts of Darjeeling and Jalpaiguri and Chittagong Hill Tracts are free from infection. In Bengal, therefore, infection is highest in the western districts and, broadly speaking, diminishes in intensity towards the east.

In Assam, the infection is present in most districts, but its intensity is less than in Bengal. Low-lying areas like Sylhet, Tezpur and Jorhat show heavier infection than other parts, but most of the districts in the hilly submontane region are free.

Orissa has many endemic areas in its coastal districts, these being amongst the most heavily infected regions in India. In certain wards of Cuttack city, for instance, the infection rate reaches as high a figure as 25 to 34 per cent. of the population. Bihar is less heavily infected. Taking the two provinces together, filarial infection is highest in the coastal belt of Orissa, high in the Gangetic plain of Bihar and lowest in the submontane arable areas.

In South India filarial infections are comparatively common, the most heavily infected areas lying in the Indian States of Travancore and Cochin and in the districts of Malabar and South Kanara of Madras Presidency. As regards Travancore, Iyengar has recently demonstrated that the infection rate in Trivandrum ranges between 10 and 20 per cent. in different parts of the town. In Cochin, where the infection rate is 21 per cent. filariasis has been recognised for a long time and the term ' Cochin leg ' is mentioned by early writers

as being synonymous with elephantiasis of the leg. All the larger coastal towns of Malabar and South Kanara districts show high infection.

Moderately infected areas in Madras Presidency are to be found in the districts of Tanjore, Kistna, Godavari, and Vizagapatam on the east coast and a survey of Saidapet, adjoining Madras city, demonstrated an infection rate of about 16 per cent. there. Non-endemic area or areas with low infection include the districts of Tinnevelly, Madura, Ramnad and Bellary and the Ceded Districts.

In Bombay Presidency, except for isolated endemic areas such as Thana, Surat and Ahmedabad, filarial infection is, generally speaking, absent. Gujarat, Surat, Kathiawar and Cutch have shown moderate infection, whilst Baroda, Goa, Daman and Diu are free.

Infection rates are low in Central Provinces, Nagpur City having the highest rate of five per cent.

In the United Provinces as a whole, the infection rate is low. It is moderately heavy in the districts lying along the banks of the Ganges, whilst the Himalayan, sub-Himalayan and western districts are free. Infection decreases from the eastern border of the province towards Lucknow.

The Punjab, the N.-W. F. Province, Kashmir, Sind and Rajputana constitute one large non-endemic block, an imaginary line from Karachi to Delhi marking of to the north and west the area free from infection.

In Burma filarial infection is confined to the areas lying along the Irrawaddy river and the sea-coast.

This brief description of the geographical distribution of filariasis indicates that infection is prevalent mainly in the coastal regions and in areas lying along the banks of large rivers. These are all flat low-lying areas and high rainfall and waterlogging over prolonged periods facilitate breeding of the mosquitoes responsible for transmission, so that efficient drainage and prevention of waterlogging would probably go far towards checking the spread of the disease. In Cochin, "the low flat land about the town surrounded by large backwaters combined with the high rainfall, optimum temperature and high humidity constitute ideal conditions for the maintenance and spread of infection," conditions which have resulted in an infection rate as high as 21 per cent. In Ernakulam, which is only separated from Cochin by a backwater, the infection rate is six per cent. because of more efficient drainage. In Bengal, it has already been noted that infection diminishes in intensity from west to east; in Eastern Bengal the larger rivers provide efficient drainage and prevent water-logging.

"Laboratory experiments have shown that the optimum conditions of temperature and humidity for the development of the embryo in the mosquito are a range of temperature between 80° to 90° F. and a humidity of over 60 per cent. Under the optimum conditions, the embryo develops in the mosquito in 6 to 7 days; when conditions are not so favourable the embryos take a longer period to mature, in some cases the period extending over 3 weeks."

Apart from this, unfavourable conditions of temperature and humidity produce a reduction in the number of embryos which develop in the mosquito. Climatic factors, therefore play an important part in determining the infection rate of a given locality. This fact may explain the freedom from this disease enjoyed by north-western India; even districts lying along the bank of the Indus have been found to be free from infection. During the survey made in the Punjab, neither hospital statistics nor the examinations of hospital, school and college populations gave any evidence of infection in spite

of the fact that *Culex fatigans* the carrier mosquito, was universally present. The extremes of climate and the relative scarcity of rain may be inhibitory factors.

The two types of infection, *Mf. bancrofti* and *Mf. malayi*, have already been mentioned; the latter is essentially rural in distribution, the former urban. The transmitting agents in the two cases are the mosquitoes, *C. fatigans* and *Mansonioides* respectively. The urban prevalence of *Mf. bancrofti*, is explained by the fact that this type breeds best in the relatively concentrated sullage of urban areas which have no proper disposal system.

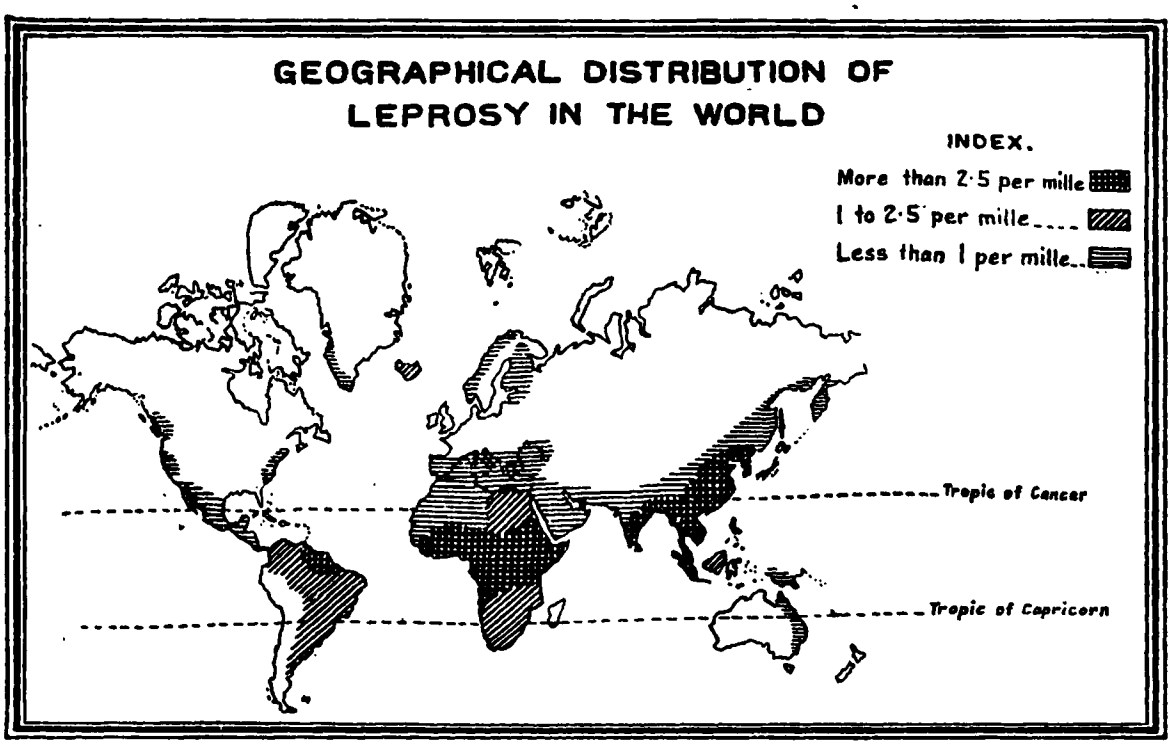
M. annulifera, *M. uniformis* and *M. indiana* have been shown to be infected in nature by *Mf. malayi*. Of these the first is the most important transmitting agent. In working out the life history of *Mansonioides*, M. O. T. Iyanger showed that the female mosquito, instead of laying its eggs on the surface of water, fixes them in clusters on the under surface of the leaves of the water plant *Pistia Stratiotes*. These larvæ, unlike those of other mosquitoes, do not come up to the surface of the water, but obtain the necessary oxygen from the air cavities of the root of the plant by piercing the root tissue by means of a modified breathing syphon. The pupæ are also similarly adapted for obtaining oxygen. It has also been shown that when Pistia is removed, the larvæ rapidly die out in spite of the presence of other plants. These researches have, therefore, indicated the method of successful control of *Mf. malayi* infection.

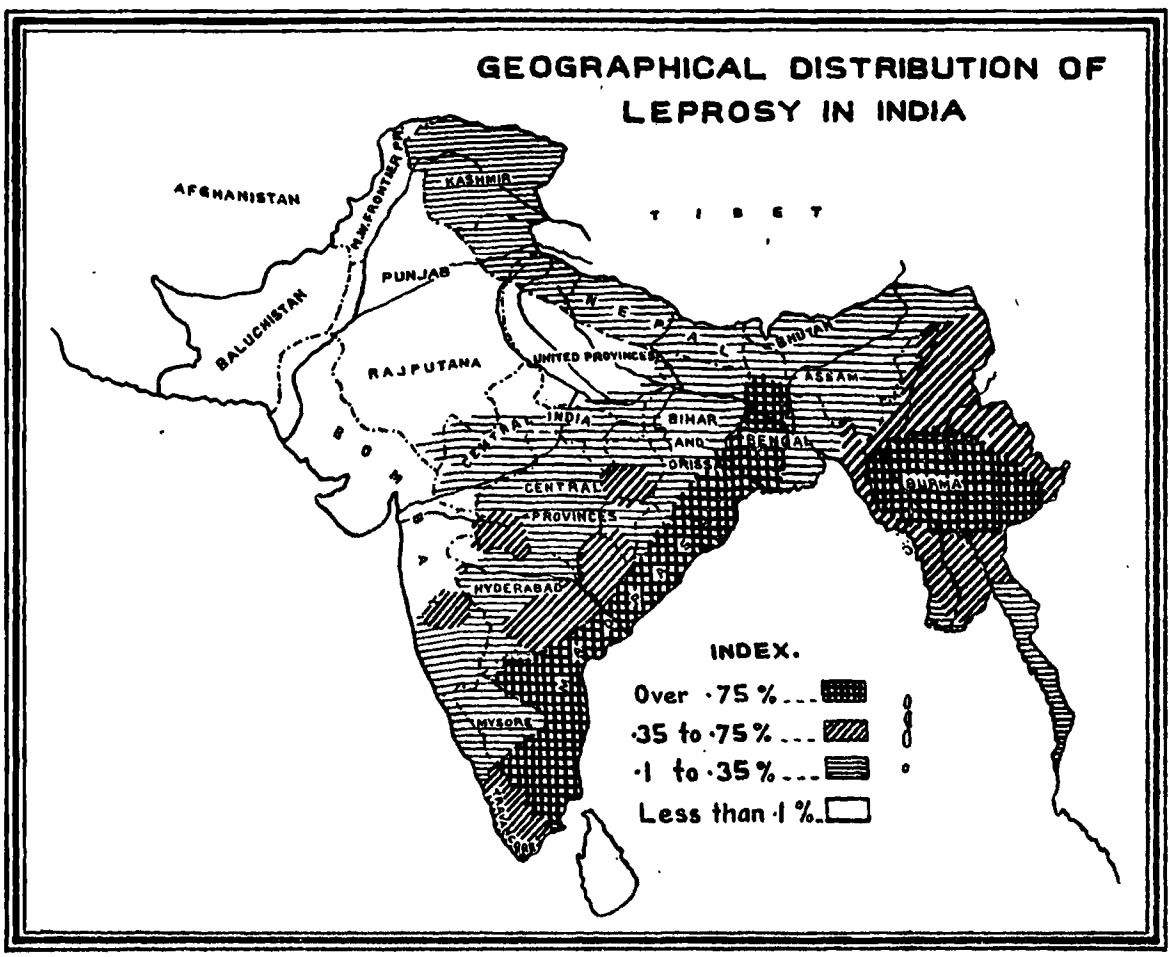
The question of filariasis in India requires much more attention at the hands of public health authorities than has so far been devoted to it. Filarial infection and the subsequent complications of lymphangitis, lymphadenitis and elephantiasis, which are the result of superimposed streptococcal infection, constitute a serious menace to the health and well-being of large numbers of persons living in endemic areas, although their effect on mortality may be small. The fact that, in spite of extended research, no satisfactory cure for filarial infection has yet been discovered, increases the necessity for a well-planned preventive campaign; at present this alone offers hope of relief to the inhabitants of infected areas.

Leprosy.

27. It has been estimated that there are no less than five million cases of leprosy in the world and it is probably correct to say that, of that number, approximately one million are to be found in India. Leprosy is now essentially a disease of the tropics although it exists in small numbers in temperate regions and cases are to be found even in the Arctic Circle. The two maps facing this page represent the distribution of leprosy throughout the world and in India; these have been reproduced, with the permission of the Editor of the Leprosy Review, from an article by Dr. John Lowe on the epidemiology of leprosy published in October, 1937. China, India, Africa and South America form the chief foci of infection, but it is to be noted that the heavily infected regions are almost wholly confined to the tropical zone. Leprosy also appears to prevail only among certain types of community.

"Among wild, free-living nomadic tribes leprosy is seldom found. Under moderately sanitary conditions it fails to spread. It is in the congested and filthy surroundings of family or communal life so common in the tropics and subtropics that the requirements for contagion are found. This is further helped by parasitic and especially cutaneous disorders which facilitate the entrance of infection. Not less important is the debilitating effect of various other diseases and poor nutrition prevalent in backward countries; these predispose to leprosy."





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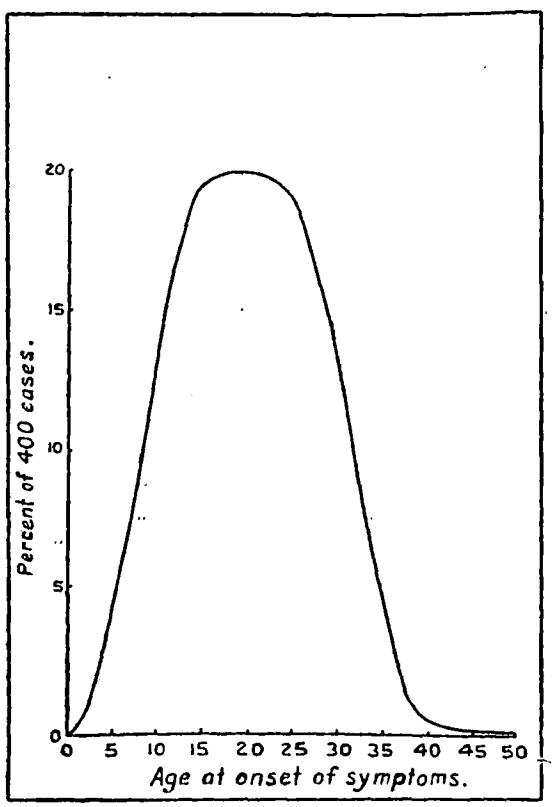
No. 8

AGE AT WHICH FIRST SYMPTOMS WERE NOTICED IN 400 UNSELECTED CASES OF LEPROSY IN INDIA.



NOTE - Reproduced from Leprosy Review, October 1937, with the permission of the Editor.

In India, it has been found that the incidence of the disease is highest along the eastern coast of the peninsula, in the western parts of Bengal and in a well-defined oval area in the centre of Burma running from east to west. From the eastern belt of high prevalence the disease gradually diminishes in incidence to the north and west, until a fairly wide area of comparative freedom from the disease is reached, comprising the northern half of Bombay Presidency, including Gujarat, Rajputana, the Western portion of the United Provinces, the Punjab, the N.-W. F. Province, Sind and Baluchistan.

In few areas in India are accurate figures relating to leprosy incidence available. During the census of 1931 the number of lepers recorded totalled 147,911 for India as a whole and 126,867 for British India. It is certain that these figures represent only a fraction of the actual numbers of infected persons in this country, because sample surveys since made in a number of areas by specially trained medical officers have shown that the incidence is much higher than the census figures indicate. For instance, in an area comprising nine *thanas* in Puri district of Orissa, the number of lepers given by village staffs was only 575, whilst an intensive expert census revealed no less than 3,835 cases of the disease. Moreover, this number is itself probably an underestimate in view of the fact that the male medical officers conducting the census were unable to examine *Purdah* women. It would seem, therefore, that the census figures should be multiplied seven or eight times in order to arrive at a reasonable estimate and the figure of one million already mentioned is not likely to give an exaggerated picture of the actual position. In this connection Dr. Lowe has made the following comments :—

"We find in the heavily infected parts, large areas where the incidence may be two per cent. of the population. We find small areas where the incidence is five or seven per cent. We find villages in which the incidence is 15 or 20 per cent."

In his opinion the average incidence in India is about three per mille of the population, and this rate corresponds fairly closely to the estimate of one million cases in the country.

One important feature of the disease in India must, however, be mentioned. It has been found that about two thirds of all cases are relatively mild and that "in some of these mild cases, the disease is of little clinical or public health importance". This fact is to be remembered in making an assessment of the public health problems presented by leprosy in this country.

From the epidemiological point of view, the greatest danger of spread of infection occurs during the early years of life. Differences in susceptibility at different ages have been clearly demonstrated by study of family groups of the general population. "Adults exposed to infection show an incidence of about five per cent. while children similarly exposed to infection show an incidence of 50 per cent. or more." The graph facing this page, which has also been reproduced from Dr. Lowe's paper, gives an indication of the age at which first symptoms were noticed in 400 unselected cases. Bearing in mind that the latent period of leprosy may be prolonged over a period of years, it is clear that most of these patients must have contracted infection during childhood or adolescence. The high susceptibility of children to the disease is, therefore, a point of great importance which should always be kept in mind in the planning of preventive campaigns.

As regards sex distribution, the experience of India and of other countries where leprosy is prevalent points to a relatively higher incidence among males than among females, the proportion being about two to one. The disease is also found generally to assume a more severe form amongst males.

The work of leprosy relief in India as in other countries is shared by official and non-official organisations. On the one hand, Provincial Governments and local authorities have developed anti-leprosy work in different directions; on the other hand, the Indian Council of the British Empire Leprosy Relief Association, the Mission to Lepers and other voluntary associations, both independently and in co-operation with Governments, are actively engaged in fighting leprosy so far as funds permit. The problem is, however, so vast that existing organisations have so far found it impossible to produce any very striking reduction in the prevalence of the disease. Anti-leprosy work in India may be said to have been begun by the Mission of Lepers when, in 1875, Mr. Wellesly C. Bailey built the first leper home at Chamba. In 1925, the foundation of the Indian Council of the British Empire Leprosy Relief Association provided a much needed momentum to the campaign, although during the intervening sixty years anti-leprosy work steadily increased both in volume and extent. A brief description of existing activities was given in last year's report, and except for the addition of a few leprosy clinics in some of the provinces, the position has not changed to any marked extent during the year under review.

There is urgent need for co-ordination of the work which is now being carried out by different agencies and this can perhaps best be assured by the formation of Provincial Leprosy Boards, affiliated to the Indian Council of the British Empire Leprosy Relief Association. The members of those Boards should include representatives of official medical and public health departments, of the Mission to Lepers and of all other agencies engaged or interested in leprosy work. In order to enlist an increasing measure of public support for the general campaign, these Boards should also include private individuals who are willing to serve and who take an active interest in the work. In directing the general campaign, a Provincial Board is advantaged by the fact that it can pool available resources and utilise these to the greatest extent, whilst its position as a central organisation enables it to make effective appeals for public support on the widest possible basis. Co-operation of the official medical and public health departments ensures that due emphasis is laid on the health aspects of the leprosy problem, apart from treatment and alleviation of suffering of individual cases. In areas where the disease is widely endemic, the appointment of a Provincial Leprosy officer and the formation of District Leprosy Boards, each with its own leprosy officer, all working in close co-operation are essential links in the chain of preventive measures.

Within recent years, a considerable expansion of treatment activity has resulted from the provision of leprosy clinics in different parts of the country. It should be remembered, however, that, whilst present methods of treatment are of undoubted value in a proportion of cases, the leprosy probelm cannot be solved by treatment alone. Leprosy in the past, has been mainly a rural problem but as Dr. Lowe has remarked, "the opening up of previously secluded areas by the development of roads and railways and the establishment of large industrial areas with large numbers of workers, recruited from rural areas, have introduced a new aspect of the problem. Healthy workers from rural areas are migrating to industrial centres with their families, there getting infected with leprosy and later returning and spreading the disease in previously unaffected villages." What can be done to prevent spread of the disease from the large numbers of infections cases which at present act as active foci of dissemination ?

It may be stated at once that for India the segregation and isolation of all infective cases of leprosy, which probably number between 300,000 and 400,000, is entirely outside the bounds of practicability. The development of rural leprosy colonies is a hopeful line of preventive work in areas where the incidence of the disease is high. If such schemes are to be successful, however, enthusiasm and missionary zeal on the part of the promoters are essential, because the promotion of a harmonious community life inside these colonies is not easy of accomplishment. In this connection a brief description of the working of the leprosy colony at Uzuakoli in Africa may be of interest. During 1936-37 the colony had a total population of 1,061 inhabitants, of whom 901 were resident patients on 31st March, 1937. A few years previously the site of the colony was a dense jungle, but Dr. Brown, the first Medical Superintendent, who built up the institution, worked with enthusiasm, patience and tact and since August, 1932, when the first patients were admitted, the colony has grown into a community of lepers, who carry out among themselves all the functions of civilized life including agriculture, industry, housing, education of the children, social activities and even maintenance of law. All patients are expected to work. Every able-bodied patient receives on admission a farm and a certain quantity of seed ; at harvest time he has to return a portion to the community store. Various local agricultural products are produced. The palm oil industry is a flourishing concern, whilst other industries include weaving, carving, tailoring, net making, manufacture of musical instruments, basket making and soap manufacture. The cultivation of *Hydnocarpus wightiana* is also being attempted. Road making and house-building are important occupations and blacksmiths and carpenters thrive. All of the 170 children in the colony attend the school which is staffed by eight teachers, some of whom had teaching experience before they joined the colony.

As the outside population have a prejudice against buying articles made by lepers, these are sold by the patients to their fellow patients, so that internal consumption forms the main incentive for industrial activity.

Exercise for the patients is by no means neglected. For many, their occupations afford sufficient exercise in the open air ; for those who work indoors, like teachers and nurses, football, volley ball and tennis provide recreation and exercise.

The most admirable part of the community life is the excellent discipline and spirit of harmony that prevail among the inmates although about 300 villages are represented in the colony. All offences are tried by a court consisting of the Chief assisted by a council of headmen and a head woman and although all have a right of appeal to a special court conducted by the medical officer, its jurisdiction is seldom necessary.

Seventeen babies have been born in the colony to leper mothers. These infants were all separated from their mothers at birth and were admitted to a Babies house, where they were brought up on artificial foods, exception being made in the case of small and feeble infants, which were permitted to be breast-fed by the mothers, care being taken to prevent contact with the mother except at the nipple.

All patients received treatment on modern lines and during the year 17 persons were discharged as cured because of " absence of symptoms, return of pigmentation and sensation in the patches, and repeated negative bacteriological examinations."

The whole institution is managed on an economical basis and running costs amount to the incredibly small sum of about Rs. 3-8-0 per patient per month, this including the staff comprised of a Medical Superintendent, a Toc H worker who looks after the industrial and agricultural side of the work, a lady honorary worker, who attends to the unaffected children and the nursing staff. This is a surprisingly fine achievement and it has been rendered possible only because of the spirit of self-sacrifice that the founder brought to task he had assumed, his genius for organisation and an understanding sympathy which enabled him to win the confidence of the African and enlist his co-operation for his own betterment.

In India, urgent need exists for the organisation of rural colonies of this kind. A large proportion of India's lepers are beggers, who flock to pilgrim centres or follow their profession in the streets of the larger cities. Many are able-bodied and could well contribute by their own labour towards their maintenance. The organisation of colonies, where these cases could settle down, would help to wean them from a life of aimless wandering and introduce meaning and purpose into their lives. A proportion of leper cases, of course, require hospitalisation, but for the large majority work and exercise are both desirable and essential even from the point of view of treatment of their disease. As Dr. Muir has pointed out :—

" Lepra bacilli are not destroyed in the body by the direct action of any yet known specific. They are destroyed by the reaction of the tissues and especially the cells of endothelial origin to the bacilli in their neighbourhood..... The golden rule for the treatment of leprosy is to improve the general health of the patient, make him physically fit, an athlete if possible ; and then press the special treatment to the point of tolerance, *i.e.*, short of again depressing the general health. But the general methods should form 85 per cent. and the special methods 15 per cent. of treatment."

In this country it should be possible to run leper colonies at a low cost. Land is cheap and the wants of the people are few, whilst the climate is such that expensive buildings are by no means necessary. The rural population, amongst whom the disease largely prevails, is already adapted to agriculture and cottage industries and the building up of self-sufficient communities, in so far as their essential needs are concerned, should not prove to be an impossible task. It would seem that the problem of segregation of an appreciable population in India might well be satisfactorily solved on these lines.

In this connection, mention may be made of a new Forest Farm Colony recently started at Mangaltarai in the Central Provinces. This is a co-operative undertaking, Government, the American Mennonite Mission and the Mission to Lepers all being represented on the Board of Control :—

" Its primary purpose is to re-establish in life arrested cases of the disease who have cleared up in Mission Homes in the Central Provinces and Berar, but who need to live under healthy conditions and with some assurance of a livelihood if the risk of relapse is to be reduced to a minimum. It is also for healthy children of lepers, that they too may have opportunity of winning from the forest their own farmstead."

An area of 6,288 acres was set aside by the Government for the purpose of providing holdings of 15 acres each and the terms of the settlement provide that, for the first two years, 20 per cent. of the persons admitted might be non-leprous people with agricultural experience in order to help the regular colonists to settle down to an agricultural life. The Government provided funds for water supply and for clearing the land, whilst the Mission to Lepers sanctioned a grant to help the colonists to tide over the first few months until the harvesting of the first crops. The American Mennonite Mission sanctioned

the appointment of one of its members as the manager of the colony and he busied himself with organising the work, establishing a rural school, introducing a medical service, supervising a co-operative society and dealing with the many other problems of a pioneer venture. The development of this undertaking will be watched with interest ; its success will no doubt encourage others to make similar attempts to relieve the leprosy situation of the country.

The great importance of protecting children from infection has already been emphasised and, under existing conditions, it is almost impossible to prevent spread of infection to this susceptible group of the community. The development of leper colonies should be able to play a prominent part in this direction. In the first place, provision can be made for the segregation of infants born to leprous mothers ; secondly, life in the colony is itself an education to the resident patient in that he learns to avoid infecting others ; and, lastly, when he is discharged, he can help to spread the knowledge he has gained amongst his friends and acquaintances.

The promotion of leprosy research has continued to be one of the main features of the work undertaken by the Indian Council of the British Empire Leprosy Relief Association and the Council's research worker assisted by a staff of clinical, pathological, bacteriological and chemical assistants carried through an extensive programme in different directions. Financial assistance was received from the Indian Research Fund Association and the School of Tropical Medicine and the All-India Institute of Hygiene and Public Health provided laboratory accommodation.

The following paragraphs give a brief summary of research work done during the year under review :—

1. *Treatment.* (*a*) *Routine.*—Under this head are included the usual methods of treatment by subcutaneous, intramuscular and intradermal injections of hydnocarpus esters or oil and examination for and treatment of intercurrent diseases aggravating or complicating leprosy. In cases of active neural and neuro-macular leprosy under treatment the disease frequently becomes quiscent and inactive and frequently remains so, but in cases of cutaneous leprosy, whilst clinical improvement is frequently seen, quiscence and arrest of the disease is much more rarely seen particularly if the disease is widely disseminated in the body when the patient first comes under treatment.

(*b*) *Experimental.*—Treatment with leprolin has been continued in a small group of selected cases chiefly of the neuro-macular type. Of 16 cases treated, most have shown improvement for a time, but in five cases the disease showed fresh evidence of activity after treatment was stopped. These results are on the whole less favourable than those obtained by the usual routine methods.

(*c*) *Colloidal copper.*—Colloidal copper in the form of a proprietary preparation was tried in a few cases, but it proved toxic and was discontinued.

(*d*) *Excision of leprous lesions.*—In a few patients with single small lesions in suitable situations, total excision has been carried out in order to determine whether such a procedure was followed by recurrence in the same or in some other site. No recurrence has so far been observed.

(*e*) Other forms of experimental treatment have been undertaken in order to relieve distressing symptoms such as neuritis, paralysis and trophic ulcers.

(*f*) *Diathermy.*—Experiments with this form of treatment in cases of ulnar neuritis were continued. Of 36 cases, 18 showed more or less complete relief, 12 showed improvement and six were not improved for discontinued treatment. In some cases, relief of the neuritis was accompanied by improvement in paralytic symptoms, *e.g.*, foot-drop.

(*g*) *Treatment of acute-leprous neuritis by injections of cobra venom.*—This was tried in a few cases, but lack of suitable clinical material has so far made it impossible to judge of its efficacy.

(*h*) *Treatment of deformities.*—In a number of cases of ulnar paralysis (claw hand), peroneal paralysis (drop foot) and facial paralysis injections of hydnocarpus preparations round the nerve and into the affected area have been carried out systematically. Of

22 such cases, improvement was seen in 9, no improvement was noted in nine whilst four cases discontinued treatment. The best results were obtained in cases of drop foot.

(*i*) *Treatment of trophic ulcer of the sole of the foot.*—The observation having been made that trophic ulcer of the sole was almost always accompanied by inflammation and thickening of the posterior tibial nerve at the ankle, the effect of injections round the nerve as well as into the sole of the foot was studied. Of 18 cases, healing without recurrence was obtained in nine, improvement was noted in seven, whilst no improvement took place in two cases. It is to be noted that this treatment was carried out in ambulatory cases, so that the healing could not be attributed to rest of the part.

(*j*) *Observation of cases.*—Definite provision was made in the clinic for careful observation of certain patients receiving no treatment. This was done partly with a view to increasing knowledge of the disease and partly because in some cases nothing else is necessary. The patients under observation were classified under three main heads :—

(1) Cases in which the diagnosis was doubtful ;

(2) Cases in which the disease was quiscent or spontaneously arrested before the patient came under observation, and

(3) Cases in which the disease had become quiscent or arrested under treatment.

In all these cases careful periodical examinations were made for signs of active leprosy. A total of 111 cases, most of which were either neural or neuro-macular and which had become quiscent or arrested, were observed during the year. Only one case showed sign of recrudescent activity of the disease.

Some cases of neuro-macular (tuberculoid) leprosy in the phase of acute inflammatory reaction were also kept under observation without any treatment for varying periods. In several instances, rapid subsidence and quiscence of the lesions was noted. These cases formed part of a study of this type of leprosy which is discussed later.

2. *Research.* (*a*) *Pathological work in relation to clinical findings.*—Careful clinical studies were made of the patients and clinical signs were correlated with bacteriological and pathological findings. These were also compared with similar studies made of patients in the Purulia Leper Asylum in Bihar. This was done with a view to determining not only the pathology of the disease, but also the definite regional variations of loprosy which appear to occur in India. In this work valuable cooperation was obtained from Dr. H. W. Wade, Medical Director of the American Leprosy Foundation and the results are being published in the Indian Medical Gazette and in " Leprosy in India." An intensive study was made of the type of leprosy which has been called " tuberculoid leprosy " because the pathological and bacteriological findings made in this type are found to be very similar to those found in tissues infected with tuberculosis. This type is commonly seen in Calcutta and its recognition and its differentiation from the ordinary type of leprous infiltration in the skin are important from the point of view of prognosis. Sometimes these cases closely simulate nodular leprosy, but the bacteriological and pathological findings and the prognosis are often very different. The results of this study have been published in " Leprosy in India."

(*b*) *Chemistry and bio-chemistry.*—The administration of hydnocarpus oil and its preparations is still the routine treatment for leprosy but not infrequently the injection of these substances gives rise to serious local reactions. Investigations were therefore made into their cause and prevention. It has been found that irritation results from oxidation of the oil, that oxidation is aided by the presence of foreign matter, moisture, air and sunlight and that to get satisfactory oil for injection all these factors must be excluded. In carrying out this study, various tests for oxidation products have been experimented with. The standard method in the past has been the test for free fatty acids, but this has sometimes been found unreliable and the iodine absorption test for the presence of peroxides has proved to be of value giving more critical results. This test, however, can only be applied to the oil and not to the ethyl esters.

A study of the biochemistry of the blood was commenced, So far, work has been confined to blood calcium diffusible and non-diffusible, and the ratio between these. A considerable amount of time was devoted to the determination of a suitable technique for the preparation of celloid in sacs and for the carrying out of tests. These difficulties have now been overcome and bloods have been tested in leprosy of various types. The results are being analysed.

(*c*) *Bacteriology.*—Attempts have been made to prove or disprove the claims of successful culture which have recently been made by various workers. Exhaustive experiments have been carried out in the cultivation of lepra bacilli specially by the methods of McKinley, Soule and Verder. Over 1,000 tubes of different media were inoculated in 24 experiments. Approximately one half of these were put under the gaseous tension recommended by Soule and McKinley and the other half were inoculated under ordinary

atmospheric conditions. These were periodically examined over a period of several months. Until October no definite evidence of multiplication of the bacillus was obtained. In that month, however, the tubes seeded in August were examined and it was found that, of the 70 tubes kept in a gaseous environment of 40 per cent. O_2 and 10 per cent. Co_2 according to the method of Soule and McKinley, 35 showed slight microscopic and considerable microscopic evidence of colony formation, many masses of acid-fast bacilli being found in smears. Multiplication of bacilli has however not been proved nor has the organism found been shown to be the leprosy organism.

On minced chick tissue medium, persistence of bacilli for a long period and the carrying over of bacilli from one tube to another has been observed, but no definite multiplication has been noted. It is believed that the Calcutta studies have disproved the findings of Salle, who reported that in tissue cultures and in minced chick-tissue media the bacilli multiply in alternating acid-fast and non-acid-fast forms at the various stages of sub-culture. The bacilli remain acid-fast and no non-acid-fast forms have been seen except for contaminants. These contaminating organisms when put into fresh media do not become acid-fast.

Work on the growth of the lepra bacillus in tissue cultures has been continued, rat tissues and rat lepra bacilli being chiefly used. Rat skin, rat spleen, rat liver have been cultured and infected with bacilli but no conclusive evidence of multiplication has been obtained. Bone-marrow as a suitable medium for the multiplication of bacilli is now being studied.

The study of histological changes seen in the various forms of leprosy has been continued and during the year many specimens taken at biopsy were examined. This work was undertaken with a view to correlating the clinical, pathological and bacteriological findings in the different forms of leprosy.

3. *Field-work.*—During the year field investigations were continued in collaboration with the Bengal branch and the leprosy investigation centre in the Bankura district was continued. The thirty clinics in different parts of the district, most of which had been established by the survey party in previous years, were handed over to the District Leprosy Relief Committee in April, although the centre has kept in touch with the work of the clinics. The survey party has during the latter part of the year concentrated on a thorough epidemiological survey on statistical lines of the whole of the population of one union board. This work is now nearing completion and statistical analysis of the results will shortly be undertaken.

Rabies and Hydrophobia.

28. Table II (*xiii*) gives the numbers of deaths from rabies in rural and urban areas recorded during 1936.

TABLE II (*xiii*).

	Deaths.			
	Rural.	Urban.	Total.	
			1936.	1935.
Total	2,073	397	2,470	2,677
N.-W. F. P.	..	..	..	2
Punjab	101	22	123	126
Delhi	..	1	1	2
U. P.	221	99	320	472
Bihar	109	5	114	164
Orissa	81	4	85	..
Bengal	611	35	646	783
C. P.	108	27	135	124
Bombay	101	33	134	180
Sind	8	..	8	..
Madras	551	115	666	546
Coorg	2	1	3	..
Assam	41	10	51	65
Burma	139	45	184	213

Whilst the preparation of anti-rabic vaccine remains confined to a few institutions, a process of decentralisation of treatment has been in progress within recent years in order to render treatment available to as many persons as possible. During 1936 arrangements for the decentralisation of treatment were completed throughout India except in the case of the Patna Institute. Information regarding the different Pasteur Institutes will be found in Section VIII of this report.

Venereal Diseases.

29. Table II (*xiv*) gives the numbers of cases treated in hospitals and dispensaries during 1936.

TABLE II (*xiv*).

	Syphilis.	Gono-coccal infection.	Soft chancre.	Other venereal diseases.	Total.	Per 1,000 of total.
Total . .	336,931	315,191	30,734	93,780	776,636	11·03
N.-W. F. P. .	8,697	2,756	102	276	11,831	5·49
Punjab . .	18,726	13,241	518	2,334	34,819	2·38
U. P. . .	43,196	30,140	1,835	3,436	78,607	9·44
Bihar . .	38,182	26,053	2,699	5,337	72,271	13·69
Orissa . .	7,774	6,530	448	1,774	16,526	9·63
Bengal .	33,998	50,372	2,973	12,501	99,844	12·34
C. P. . .	18,293	12,908	962	4,123	36,286	10·89
Bombay .	22,682	21,429	3,220	7,925	55,256	19·30
Sind . .	7,499	4,373	407	1,145	13,424	15·10
Madras . .	103,643	116,288	11,453	49,060	280,444	16·91
Coorg . .	108	309	3	49	469	1·46
Assam . .	2,064	4,259	130	350	6,803	3·11
Burma . .	31,738	26,308	5,966	5,422	69,434	20·81
Baluchistan .	331	225	18	48	622	0·92

These figures give no accurate indication of the prevalence of venereal diseases in different parts of the country. It will be noted that by far the largest number of cases was treated in Madras Presidency. The Surgeon General with the Government of Madras stated in his triennial report for the period 1932-34 that—

"From all the evidence available it appears that the incidence of venereal disease in rural parts of this province is very heavy and an attempt is being made to ascertain its actual gravity. Among the poorer classes it is probably over 50 per cent. and in some places more."

This is a high incidence rate and, if it be even approximately correct, it represents a state of affairs which must give rise to grave concern. In 1933 Major-General Sir John Megaw made an enquiry into certain public health

aspects of village life in India. He estimated that there were about 5½ million persons actually showing signs of syphilis and about 7½ millions suffering from gonorrhœa. This gives a total of approximately 13 million persons out of a total population of 353 millions or a percentage of nearly 3·7. General Megaw went on to say that, " if account be taken of those who have had the disease and have lost all obvious signs, it would probably be well within the mark to assume that 10 to 15 per cent. of the inhabitants suffer from syphilis at some time or other during their life time." According to his data the infection rate was much the highest in the provinces of Bengal and Madras, whilst the Punjab had a very low rate. These wide differences were confirmed by information from other sources.

Even admitting that those figures provide only approximate estimates, they nevertheless give some indication of the magnitude of the venereal diseases problem. Unlike cholera, smallpox or plague, the two venereal diseases are not spectacular in their effect. On the other hand, syphilis is undoubtedly the cause of much infant and child mortality. Many infant deaths, ascribed to prematurity or debility, probably have their root cause in syphilitic infection of the parents. Taking the 1936 figures for Bombay City, for instance, out of a total of 8,946 infantile deaths, no less than 3,651 or nearly 41 per cent. were attributed to prematurity or debility. In adult life also, few organs of the body are not adversely affected once the syphilitic poison gains an entry and the mortality figures attributed to " other causes " must be influenced in varying degrees by the prevalence of syphilitic infection.

Gonorrhœa is generally but erroneously regarded as a less serious disease. During the process of birth, the eyes of the infant may become infected with disastrous results to eyesight. As Sir Arthur Newsholme has pointed out, this type of infection is responsible for some 30 to 40 per cent. of the inmates of blind asylums in England. Gonorrhoea is also a frequent cause of sterility in women, whilst it commonly produces chronic inflammation of the female pelvic organs and causes a vast amount of prolonged invalidism. The part that these two diseases play in causing ill-health cannot therefore be ignored in any general scheme of health endeavour.

A successful campaign against venereal disease can only be based on sound education of the people in respect of prevention and on the provision of adequate facilities for early diagnosis and treatment. In England the danger of widespread dissemination of venereal diseases among the civil population after the Great War was early recognised and a vigorous antivenereal diseases campaign was started about 1917. Compulsory notification found no favour, but a well-organised scheme of public education and adequate provision for treatment has brought about a striking reduction in incidence. In his 1935 report the Chief Medical Officer of the Ministry of Health stated that " cases of syphilis in the various stages, early and late, dealt with for the first time at the centres after rising to a maximum of 42,805 in 1920 had fallen to 22,010 in 1924 and had then remained more or less stationary until 1932 when a new fall commenced, and in 1934 a new low record of 20,692 had been reached. The fall continued in 1935, to 19,335." That this reduction was real is supported by the fact that the number of treatment centres had increased from 113 in 1917 to 185 in 1935. It is therefore clear that in England great progress has been made during the last 20 years.

In India the fight against venereal diseases can hardly be said to have begun. In the larger hospitals, facilities for diagnosis and treatment exist to some extent, but these touch only the fringe of the problem. In Madras

Presidency, where treatment has been organised to a greater extent than in other provinces, 32 clinics are at work, these being attached to Government hospitals in different centres. In Madras City, the General Hospital has an up-to-date Venereal Diseases Department which not only provides treatment, but serves as a centre for the training of medical practitioners in modern methods of diagnosis and treatment. During 1936 the average daily attendance numbered 153 and 8,402 patients in all were dealt with. An encouraging feature, from the community health point of view, was the increasing recognition by women of the necessity for early treatment; out of 1,436 female patients as many as 1,027 or 71 per cent. were married women. At the same time, many cases abandoned attendance at the clinic before a cure was established and improvement in this direction will require prolonged educational effort in regard to the dangers of insufficient treatment.

No campaign against venereal diseases can succeed without communal action against such social evils as prostitution and traffic in women. In India, the problem is complicated by various social customs and religious observances, but within recent years a growing public interest in the subject has had effect. Laws making illegal the keeping of brothels or the living on immoral earnings of women have been passed by several provincial legislatures, including Bombay, Madras and Bengal, whilst the States of Pudukottah, Cochin and Travancore have also abolished vice areas and have rendered illegal the keeping of brothels. With the development of public opinion and the wider recognition of the problems involved, there seems to be every hope of a larger and desirable measure of legislative and administrative action in this field.

In this connection, mention may also be made of the work of the Indian Association for Moral and Social Hygiene which has its headquarters in New Delhi and which now has branches in the Punjab, in the United Provinces, in Mysore State and in Assam, together with affiliated societies in Bengal and Hyderabad (Deccan). The work of this Association so far has been mainly in the direction of (1) investigation and research in brothel areas into the causes lying behind the girls' entry into this life, (2) the promotion of legislation, (3) education of the public and (4) co-operation with different agencies interested in the rescue and rehabilitation of girls, such as the Salvation Army, Missionary Societies and the Brahmo Samaj, Seva Sadan and Servants of India Societies.

Yaws.

30. Manson-Bahr states that "yaws is common in tropical Africa, the West Indies, Ceylon, the Pacific Islands, Papua, the East Indies, and Malay States. In India and China it appears to be rare." In this country, as far as is known yaws is to be met with only in Assam and Burma. In Assam, 3,496 cases were treated as compared with 4,201 in 1935, but this decrease should not be interpreted as a decrease in incidence.

In Burma, yaws is endemic in Victoria Point subdivision, Bokpyin township and in the interior of Tenasserim and Palaw townships of Mergui district, whilst it is also prevalent in a few other areas. The disease is said to occur most frequently among the Salons, Malayas and Siamese, although it is found also among Burmans and Karens. Sub-assistant Surgeons of the Medical Department were deputed to carry out treatments and local bodies were responsible for other measures.

Kala-Azar.

31. The following table gives the numbers of kala-azar cases treated and the deaths in hospitals and dispensaries in the different provinces :—

TABLE II (*xv*).

	No. of cases.	No. of deaths.
N.-W. F. P.	..	..
Punjab	24	..
Delhi	..	..
U. P.	695	9
Bihar	68,252	237
Orissa	47	2
Bengal	84,839	369
C. P.	13	..
Bombay	20	2
Sind	5	..
Madras	1,919	13
Coorg	..	..
Assam	5,327	50
Burma	77	9
Ajmer-Merwara	2	..

Kala-azar continues to be a rare disease in the provinces of N.-W. F. P., Punjab, Delhi, the U. P., Orissa, C. P., Bombay, Sind, Coorg and Burma ; in other provinces it is more or less endemic.

In Bengal Presidency, where the total kala-azar deaths during 1936 numbered 21,161, the disease has been steadily gaining ground within recent years. This may be seen from the following table which gives the numbers of cases treated for kala-azar in the medical institutions of the province during the past five years :—

1932	105,840
1933	129,539
1934	121,142
1935	138,274
1936	137,791

The mortality recorded during the year under review was 68 per cent. above the average for the last ten years. Five hundred and fifty-four deaths were returned from urban areas and of this total, 146 occurred in Calcutta alone. In rural areas, the number of deaths increased from 16,895 to 20,607.

In Bihar, the largest numbers of cases treated in the hospitals and dispensaries were recorded in Saran, Muzaffarpur, Darbhanga and Bhagalpur districts.

The number of kala-azar patients treated in Assam fell from 11,100 in 1935 to 10,587 during the year under review and the number of deaths from 845 to 753. As compared with the decennial average, the number treated during 1936 decreased by 49 per cent. and the deaths by as much as 51 per cent. Table II (*xvi*) shows the distribution of the disease in Assam as recorded in medical institutions.

TABLE II (*xvi*).

Districts.	1936.		Decennial mean (1926-35).	
	No. of cases.	No. of deaths.	No. of cases.	No. of deaths.
Cachar	574	2	417	5
Sylhet	3,645	173	7,466	448
Goalpara	1,276	84	2,090	143
Kamrup	1,309	61	3,137	248
Darrang	636	155	1,718	225
Nowgong	1,471	121	2,825	243
Sibsagar	864	99	1,554	94
Lakhimpur	6	..	17	2
Khasi and Jaintia Hills	..	10	33	2
Naga Hills	5	..	9	..
Lushai Hills	..	..	1	..
Garo Hills	793	47	1,510	130
Sadiya Frontier tract	..	1	3	1
Manipur State	8	..	50	..
Total	10,587	753	20,830	1,542

Relapsing fever.

32. If the recorded figures are to be taken at their face value, relapsing fever was widely prevalent a few years ago in different parts of this country. In some areas, severe epidemics certainly caused a heavy mortality, but in a number of instances, it has since been found that the figures under this heading were wrongly classified. Although there is little doubt that the incidence of the disease has rapidly fallen during recent years, the same error continues to occur. For instance, the D. P. H., C. P., reports that "the number of deaths registered was 1,706 or a death rate of 0·11 p. m. against 4,538 and 0·29 in 1935. This disease was not reported by medical officers in their daily reports. There has been no confirmation by medical officers of any death alleged to have been caused by relapsing fever. Deaths under this cause have undoubtedly been recorded incorrectly." The following remarks of the Director of Public Health, Bengal, on the incidence of this disease are also pertinent ;—

Real cases of relapsing fever are very rare in Bengal. This disease was often confused hithertofore in the rural areas with malarial and other fevers in which relapses are a notable feature. As a result of the detailed instructions issued from the Bengal Public Health Department, more precision in the matter is now being observed by the reporting agencies. Eight deaths were registered as due to relapsing fever in the whole province during 1935 while seven were reported in 1936 as will appear from the subjoined statement :—

	Province.	All towns.	Calcutta.	Rural areas.
1935	8	..	..	8
1936	7	1	..	6

As regards other provinces, the Punjab reported 48 deaths, 11 in urban and 37 in rural areas. In Bihar, four deaths were reported from municipalities as also in Assam and one death in the urban areas of Madras Presidency. Bombay and Sind reported no deaths from relapsing fever during the year ; in regard to Burma and Orissa, no deaths were recorded in municipalities. No information is available regarding the N.-W. F. P. and Delhi Province.

Influenza.

33. The cyclical character of influenza epidemics is well known. Creighton has mentioned a series of outbreaks of epidemic disease " not distinguishable from what we now think of as influenza ", dating as far back as 1173 A.D. and occurring at irregular intervals. The great pandemic of 1918-1919 exceeded all previous known outbreaks in its severity and in India, where it spread " with a toxicity surpassed by few epidemiological competitors," the disease is estimated to have caused approximately 14 million deaths in the course of a few weeks. Since then, influenza has appeared at irregular intervals in mild epidemic form, but generally speaking it has not caused any very high mortality. In Bombay Presidency for example, during 1918 and 1919 deaths from influenza numbered 859,021 and 38,778 respectively ; during 1935 and 1936, the figures were only 169 and 155.

The number of deaths recorded during 1936 in the different provinces included two in N.-W. F. P., 47 in the Punjab, 642 in U. P., 77 in Bihar, 35 in Orissa, 2,502 in Bengal, 342 in C. P., 155 in Bombay Presidency, four in Sind and 267, 62 and 80 in the urban areas of Madras, Assam and Burma, respectively.

The following table gives the number of cases treated in hospitals and dispensaries during 1936, along with the number of deaths. Case mortality was definitely low, an indication of the mildness of the present form of the disease :—

TABLE II (*xvii*).

	Number of cases.	Number of deaths.
N.-W. F. P.	3,459	1
Punjab	31,875	1
Delhi	125,318	94
U. P.	100,724	1
Bihar	106,982	17
Orissa	12,897	..
Bengal	238,084	53
C. P.	49,995	16
Bombay	82,715	28
Sind	7,059	..
Madras	300,558	96
Coorg	7,195	..
Assam	33,239	7
Burma	36,379	9
Baluchistan	1,724	..

Goitre.

34. A total of 129,870 cases of goitre was treated in the hospitals and dispensaries in the United Provinces, the largest numbers being recorded in the districts of Azamgarh 5,514, Almora 2,907, Ballia 3,058, Basti 15,158, Bahraich 17,732, Dehra Dun 4,668, Fyzabad 5,482, Gorakhpur 14,633, Gonda 29,000, Garhwal 4,981, Kheri 8,301, Moradabad 2,042, Naini Tal 2,977 and Saharanpur 4,109.

In Bihar, 95,836 cases were treated ; of this total, 36,292 were recorded in Champaran district alone.

As regards other provinces, 3,577 cases were treated in N.-W. F. P., 34,162 in the Punjab, 1,130 in Orissa, 32,969 in Bengal, 141 in C. P., 303 in Bombay, 51 in Sind, 685 in Madras, 39,115 in Assam and 28,000 in Burma.

In Burma, goitre is endemic in the Shan States, Bhamo, Upper Chindwin, Katha and Pakokku districts and is also prevalent in the districts of Henzada, Toungoo, Salween and Minbu. It is commonly found in Kengtung subdivision of the Southern Shan States, but the inhabitants there seldom seek treatment. In the Northern Shan States, Namhasan and Kutkai recorded the highest incidence and during the year 8,659 cases attended hospitals for treatment. In the Chin Hills a locally manufactured common salt, popularly believed to be a cure, was analysed by the Chemical Examiner at Rangoon and was found to contain nearly 92 per cent. of sodium chloride along with traces of alkaline compounds, but no iodine was detected.

Guineaworm.

35. Cases of guineaworm treated in hospitals and dispensaries during 1936 included 589 in N.-W. F. Province, 1,379 in Punjab, 2,368 in U. P., 22,097 in Bihar, 2,776 in Orissa, 45,752 in Bengal, 717 in C. P., 7,308 in Bombay, 16 in Sind, 6,306 in Madras, 74 in Assam, 100 in Burma and seven in Baluchistan. The Director of Public Health, C. P., reported that, as the chief sources of infection are step-wells, their conversion to draw-wells has been taken in hand.

Diphtheria.

36. As indicated in last year's report, the records for this disease are of doubtful accuracy and give little clear indication of its actual incidence. During 1936 recorded deaths from this cause in the Punjab numbered 106 as compared with 91 in the previous year. Of this total 51 occurred in urban and 55 in rural areas. Sixty-three deaths were recorded in U. P., 56 in urban and seven in rural areas ; of the former 10 were recorded in Lucknow alone and eight in Agra. In Bengal 410 deaths were reported, of which 282 were in rural and 128 in urban areas. In C. P., 134 deaths were registered, 40 occurring in Yeotmal district alone. Forty-three deaths were registered in Bombay Presidency and 43 in Sind ; of the latter 23 occurred in Karachi. Three deaths from diphtheria were recorded in Ranchi in Bihar, 31 in the towns of Burma and five in Delhi Province.

The numbers of cases treated in hospitals and dispensaries during the year under review are shown in Table II (*xviii*) below ; these give some general idea of the relative incidence of the disease :—

TABLE II (*xviii*).

Province.	Number of cases treated.	Province.	Number of cases treated.
N.-W. F. P.	63	Bombay	143
Punjab	608	Sind	148
U. P.	776	Madras	923
Bihar	588	Coorg	1
Orissa	80	Assam	39
Bengal	1,457	Burma	99
C. P.	284	Baluchistan	1

Typhus fever.

37. The records of typhus are of doubtful accuracy and probably do not give much indication of the actual incidence of the disease. In C. P., during 1936, 1,045 deaths were registered as due to this cause, but only five authentic cases with three deaths were reported by Civil Surgeons and all of these occurred amongst troops in Jubbulpore cantonment. In the opinion of the D. P. H., the majority of the other recorded deaths were incorrectly classified.

The records of cases treated in hospitals and dispensaries are given below. These show that the louse was the vector in 21 per cent. of the cases, ticks in 7 per cent. and in the remaining 72 per cent. the vector was unknown :—

TABLE II (*xix*).

Typhus fever.

	Louse.		Tick.		Unknown vector.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
N.-W. F. P.	29	..	54	..	4	..
Punjab	96	6	1	..	72	..
U. P.	103	2	90	2	1,750	1
Bihar	41	1	22	..	127	1
Orissa	7	1	2	..	32	..
Bengal	260	..	10	1	302	2
C. P.	38	2	2	..	103	1
Bombay	155	..	..	..	44	..
Sind	8	..	..	..	..	..
Madras	138	..	109	..	632	..
Coorg	..	..	..	..	..	..
Assam	..	..	..	..	..	..
Burma	25	1	9	..	34	..

Cancer.

38. During the present century, the cancer problem has been the subject of increasingly intensive research in western countries, the chief stimulus to this effort being the progressively rapid increase in the recorded incidence of the disease. Until recently, the general impression in India has been that cancer claims a much smaller percentage of victims than in Europe and America. One of the reasons for this may be that medical and health reports have made little mention of the disease, but that again may be due to the fact that even in the largest cities, the system of registration provides little opportunity for the correct diagnosis of the cause of death. Accurate information being so deficient, the Indian Research Fund Association three years ago decided to initiate an enquiry into the prevalence of cancer in this country and was fortunate enough to obtain the services of Dr. Viswanath of the Pathology Department of K. E. Medical College, Lahore, who willingly sacrificed several annual college vacations for the purpose. In view of the impossibility of obtaining any material of value from vital statistical records, it was decided to approach the problem by investigating the records of a number of the large teaching hospitals in different provinces. Whilst it was recognised that hospital populations were selected groups and that the prevalence of cancer in such groups could hardly be claimed to give a correct estimation of the

incidence of the disease in the general population, it was felt that, in the absence of specific information with respect to the community as a whole, the investigation would provide data which could be at least related to the incidence of other diseases in the hospital populations and that some light might be thrown on the general question.

This enquiry which covered every province in India, including Burma, has recently been completed and the findings have been summarised by the investigator in the following terms :—

"This survey covered records of 22,753 pathological post-mortem examinations yielding 869 cases of malignant disease, which meant that one out of every 26 autopsies related to a case of malignant disease. The proportion of cancer to sarcoma in this serier was as 4·8 : 1. In every province the preponderating incidence of cancer—over 50 pe, cent.—was in the gastro-intestinal tract. Female genital organs came next in order then carcinomas of the buccal cavity, breast, skin and penis. ''

The records of pathological laboratories of teaching hospitals were also consulted. Malignant disease was diagnosed in 9,982 cases. Approximately one out of every five biopsy specimens examined was diagnosed malignant. Because of the paucity of exploratory operations for diseases of the gastro-intestinal tract, cancer of this site did not occupy a prominent position in this series. The sites in order of frequency were female genitals, buccal, breast, skin, penis and gastro-intestinal tract.

The records of 793,929 in-patients from hospitals attached to medical colleges and schools were studied and 17,991 cases of malignant disease came under notice, representing a proportion of 1 : 44·7. One does not expect conformity in regional frequency between histological and clinical records, because the latter concern many cases of malignant disease of inaccessible sites as well. The order of frequency in regard to sites affected in cases clinically diagnosed was as follows : female genitals, buccal, gastro-intestinal tract, breast, penis and skin.

It is difficult to offer an analysis of all the sites affected, which leaves a substantial number of cases to be classified under the heading 'miscellaneous'.

The age of maximum incidence of cancer in this country is at least ten years earlier than in Western Countries and Jap. n and in the case of cancer of the female generative organs earlier by 15—20 years. In every province, including Burma, the incidence of cancer of cervix falls heaviest on Hindu women. The incidence of buccal cancer falls heavier on the male than on the female and on Muslims more than the Hindus. This form of cancer has its lowest incidence in the Punjab, where *pan* chewing is not indulged in to the same extent as in other parts of India. Unhappily this habit is growing sapidly in that province as well. Penile cancer is peculiarly a disease of the uncircumcised communities and out of a total of 611 cases noted in biopsy records and 1,080 cases in clinical records, only 17 cases were recorded among Muhammedans in the former series and 29 in the latter.

In the whole of this enquiry the aetiological role of irritation in the incidence of cancer has stood out prominently. Whether it was the cervix, the oral cavity, the penis, the skin or the gastro-intestinal tract, the factor of irritation seems to excel all other possible causes and brings the problem of this fell disease within the scope of preventive medicine.

Although this survey cannot fix decisively the relative position of cancer amongst the causes of mortality in India, it affords sufficient evidence as to this position being not insignificant. It should at least pursuade foreign writers on the subject to be less dogmatic about the rarity of this disease in India. The writer of this note believes that if vital statistics were as carefully collected in India as they are in the West and proper allowance made for the number of individuals living per thousand at a given age, the incidence of cancer will be found to be independent of geographical and racial variations."

As the statement has been made that, if reliable data were available the incidence of cancer in this country would be found to be little different from that of western countries, it may be of interest to set out some of the English statistics relating to this disease.

In 1935, the death rate from all causes was 11·7 per 1,000 and for cancer alone it was 1·6 per 1,000.

The following statement gives the mortality from cancer in England and Wales from the beginning of the present century :—

TABLE II (*xx*).

	Deaths.
1901-05	867
1906-10	939
1911-15	1,055
1916-20	1,182
1921-25	1,269
1926-30	1,411
1931	1,484
1932	1,510
1933	1,526
1934	1,563
1935	1,587

The most striking feature of these figures is the progressive and unbroken rise in cancer mortality during the last 35 years. Quite apart from any actual increase in incidence which may have occurred, two factors are possibly of some importance. These are (1) the increasing longevity of the population, cancer being a disease chiefly of later life and (2) more accurate registration of cases, due partly to improved facilities for diagnosis and partly to a greater readiness on the part of the people to seek medical advice.

The campaign against cancer in England has been pursued, within the past few years, both on the lines of a coordinated programme of research and of more scientific methods of diagnosis and treatment. The Ministry of Health, the local authorities and voluntary workers have all played their part in this campaign. From 1922 onwards, a Departmental Committee of the Ministry of Health has had the general problem under investigation. This Committee includes the Chief Medical Officer of the Ministry and a number of members of the medical profession with expert knowledge of the disease in its various aspects, clinical, pathological, experimental, surgical, and statistical. As regards local authorities, some of the larger municipalities have given the question studied attention, especially those in which centres of medical education are situated. Lastly, in 1923 was founded the British Empire Cancer Campaign, a voluntary organisation with its centre in London, whose object is " to correlate and extend all existing efforts in fighting cancer ". Apart from its function of coordinating activities, it collects and distributes funds for research.

Recent investigations into the aetiology of the disease have been mainly in two directions, that of carcinogenic substances and that of ' virus diseases '. The carcinogenic property of tar has been shown to be due to its constituents, the benzpyrene and benzanthracene compounds, and recent work has led to

" the important discovery that their chemical constitution was closely similar to that of substances produced in the human body, sterols, bile acids and sex-hormones, and the finding that some of these metabolites, or derivatives of them are themselves active cancer producers under experimental conditio ns.*"

* Page 106, annual report of the Chief Medical Officer of the Ministry of Health, England and Wales, for 1935.

The question whether carcinogenic substances, which are produced in the laboratory from such normal constituents of the body as bile acids and sterols, are formed as abnormal metabolites within the body is also being closely investigated.

The former conception that the effects produced by carcinogenic substances were confined to the site of application requires modification.

"A hormone with carcinogenic action, oestrin, applied to the skin has been shown to give rise to tumours not upon the skin, but in such distant organs as the breast and perhaps the pituitary body. Not only have tumours now been induced in a number of organs, *e.g.*, lung, liver, kidney, and by various methods of administration, but also apparently all carcinogenic chemical compounds are capable of giving rise to either a carcinoma or a sarcoma. Some of these experiments suggest that inhalation is not the only way in which carcinogenic agents reach the lung. Hitherto, it seems, no tumours of the alimentary canal have been induced by feeding with carcinogenic compounds.*"

As regards the theory that cancer is due to a 'filterable virus', work has been mainly carried out in connexion with certain tumours of fowls. It was shown in 1910 by Peyton Rous that a sarcoma of the domestic fowl could be transmitted from fowl to fowl by tumour filtrates rendered cell-free by passage through bacteria-proof filters. Since then a great deal of work has been done on this subject. These filterable agents—

"reproduce always and precisely the tumours from which they are obtained, and are recoverable in greatly increased amount from the tumour which they originate."

Recent researches appear to have shown connecting links between the two theories of carcinogenic substances and filterable viruses.

"It was found that a tumour produced by a carcinogenic substance might exhibit the feature of transmissibility by cell-free extracts so characteristic of the virus-produced tumours. Again, the apparent limitation of this latter type of tumour to birds became open to revision when a tumour transmissible in a similar way was found to occur in a mammal (the rabbit)."

In the wild rabbit it would appear that the tumour remains innocent while on transference by means of cell-free extract to the domestic rabbit it becomes malignant in course of time.

These are a few only of the more interesting findings of recent years in connection with the etiology of cancer but many obscure and puzzling points still await elucidation. Researches spread over the whole field are being actively pursued and as the Chief Medical Officer of the Ministry of Health states, the advances made in our knowledge of the disease are so important that they should

"give pause to those who, unduly impressed by the phrase 'the cause of cancer is unknown' too readily assume that nothing is known of the causation of cancer and plunge into the field of hypothesis."

From the point of view of treatment certain progress has also been recorded. The investigations of the Departmental Committee were mainly directed to cancer of the breast, the uterus and the rectum. It has been shown that, in operable cases, success as judged by survival up to five years is approximately the same for operative and for radiation treatments, namely about 40 per cent. Further, of cases beyond the reach of surgery, about 10-12 per cent. were shown to be free from the disease for the same period after radiation treatment. Even in cases, which were so advanced as to negative curé, considerable alleviation of symptoms was secured by the application of radium.

* Page 117, annual report of the Chief Medical Officer of the Ministry of Health, England and Wales, for 1936.

Another direction in which accurate information has been obtained is with regard to the interval between the onset of the disease, as observed by the patient, and its fatal termination in cases where no radical treatment was carried out. This period varies with the individual and with the organ affected. For instance, the course of cancer of the breast in some cases has been extremely protracted. An average figure for each organ, based on large scale experience, may be termed the 'natural duration' of the disease; for some of the common accessible sites the periods are—

	Months.
Breast	38
Uterus	20
Rectum	26
Tongue and mouth	16
Larynx	14
Oesophagus	12

In the preventive field, unfortunately, little progress has been recorded, except in so far as the recognition of the carcinogenic factor of irritation with respect to certain occupations has led to action ensuring as far as possible elimination of those risks.

In regard to India, the enquiry already referred to has emphasised the role of irritation as a factor in the causation of the disease. Moreover, the coincidence between the geographical distribution of buccal cancer and of the habit of *pan* chewing can hardly be accidental. The fact that penile cancer was found to preponderate in the uncircumsized communities and that, out of a total of 1,691 cases collected from biopsy and autopsy records, only 46 cases occurred among Mohamedans, lends further support to the aetiological role of irritation in the production of cancer in this country.

No definite campaign against cancer has so far been planned in this country. Because of the cost of the material and the specially trained staff required, only in four or five institutions is radium treatment available, these including the Lady Hardinge Medical College, New Delhi; the Radium Institute at Patna in Bihar; the Chittaranjan Seva Sadan and the Bengal Cancer Institute, Calcutta; and the Barnard Radiological Institute in Madras. This last is maintained by the Provincial Government and a scheme for making treatment available in the hospitals of Madras city and in some of the moffussal hospitals is under the consideration of the Government of Madras. From the point of view of a general campaign against cancer, however, the role of radium treatment though important, covers only one part of the field. One of the most urgent requirements is education both of the medical practitioner and of the general public. Although much more remains to be done with respect to the causal factors of the disease, two facts stand out prominently. One is that the treatment of cancer, in accessible sites, gives satisfactory results, if a diagnosis is made early and if the best methods are available. The other is that few cases consult a doctor at an early stage of the disease. Sir John Robertson, speaking of his experience in Birmingham as Medical Officer of Health, stated that, on an average, women waited over 10 months before applying to a doctor after noticing a lump or some other indication of trouble in the breast. In India, though no figures are available, it is certain that this period must be much longer.

The general practitioner also requires education in modern methods of diagnosis and treatment. The Chief Medical Officer of the Ministry of Health, England, stated in his 1935 report : "

"It is only necessary to instance the fact that what were regarded 30 or 40 years ago as classical signs in the diagnosis of breast cancer would now-a-days relegate a case to the almost hopeless class."

In England, as part of the general propaganda campaign, courses of lectures are given by reputed surgeons to medical practitioners.

In India, whilst it may not meantime be possible to plan any extensive campaign, there are certain directions in which work might well be carried on. In the first place, the necessity for further research into the general problem is obvious. Secondly, the training of medical practitioners in early diagnosis of the disease and in modern methods of treatment is also within the bounds of practical politics, although the provision of additional radium treatment centres is a more difficult question. Lastly, the task of spreading information among the general public in regard to the prevention and cure of the disease is one which should be undertaken primarily by the general medical profession supported and aided by Governmental medical and public health departments.

Cerebrospinal Meningitis.

39. During 1936 a general reduction in the incidence of cerebrospinal fever occurred in every province. In the N.-W. F. P., the disease was prevalent in mild form, 28 cases with 13 deaths being recorded against 52 cases and 17 deaths in the previous year. Case mortality was 46 per cent. The district of Dera Ismail Khan was worst affected, 12 cases and six deaths being recorded. The incidence of the disease reached its peak in March and, of the 13 deaths, 11 occurred amongst Muhammadans and two amongst Hindus. As regards sex incidence, nine of the deaths were among males and four among females.

In the Punjab, 205 cases with 91 deaths were recorded. Of these, 25 cases occurred in the Borstal Jail, Lahore, where the disease had been prevalent for the past four years.

The total number of cases notified in Delhi Province was 139, of which 121 occurred in Delhi city where conditions for the spread of the disease are favourable. Deaths numbered 90, giving a case mortality of 64·7 per cent. and, of this total, 80 occurred in Delhi city alone. Whilst the incidence of the disease showed a marked decrease as compared with the previous year, the case mortality remained high. As in past years, the largest number of cases occurred during the cold weather, particularly in the months of February and March, congestion and lack of ventilation during the winter months being probable contributory causes. Males were as before more severely affected than females, 111 attacks occurring amongst the former and only 28 amongst the latter.

Eighteen deaths from this disease were reported from Ajmer-Merwara.

In the U. P., a total of 236 deaths was recorded during the year under review as compared with 756 in 1935 ; 207 deaths were reported from urban and 29 from rural areas. Most of the cases occurred in persons between 10 and 35 years of age, whilst infants under one year and persons over 55 years of age were least affected. The incidence rate was higher amongst males than amongst females and amongst Mohammadans than amongst Hindus.

Cases were generally isolated and treated in the infectious diseases wards of civil hospitals where special arrangements existed for lumbar puncture and for repeated injection of anti-meningococcus serum. The disease was found to be irregular in its distribution as cases occurred in different *mohallas* widely separated from one another.

Seventeen cases of cerebrospinal fever were treated in hospitals and dispensaries in Bihar during 1936 as compared with 55 during the previous year. In Orissa 55 cases were treated in hospitals and dispensaries ; of these five proved fatal.

The disease was responsible for 910 deaths in Bengal. Of these, 432 were recorded in Calcutta City alone, 28 in other towns and 450 in rural areas.

In the districts of Sibsagar and Naga Hills in Assam only four deaths from this cause were recorded. In Manipur State, the disease was responsible for 95 deaths.

Eighty-two attacks with 68 deaths were reported in the C. P., corresponding to a case mortality of 82·9 per cent. Nagpur district recorded the highest number. As compared with previous years, the incidence showed a decrease. Precautionary measures were taken by the medical officer of health of Nagpur to prevent the spread of the disease in the mill and other infected areas. Temporary regulations under the Epidemic Diseases Act were enforced in Nagpur, Amraoti town, Amraoti Camp and Chikalda.

A total of 407 deaths was registered as due to cerebrospinal fever in Bombay Presidency as against 375 in 1935. Bombay city was worst affected, recording 353 attacks and 228 deaths ; in Ahmedabad town, which has been a stronghold of this disease since 1933, the incidence decreased ; in other parts of the Presidency the infection prevailed only in sporadic form. In Bombay city whilst the disease was present throughout the year, its incidence was highest during the first quarter and the largest number of deaths was recorded during March. In Ahmedabad, cases also occurred throughout the year, the largest number of attacks being recorded in April and the smallest in September. The incidence of the fever was not confined to any particular locality and persons between the ages of 10 and 30 years suffered most. Preventive inoculations were carried out in most of the urban localities affected ; few persons, however, offered themselves for inoculation probably because of the sporadic nature of the disease.

In Sind, only 18 sporadic attacks and 11 deaths were recorded as against 44 and 29 respectively during the year 1935. These figures give a case mortality of about 61 per cent. as compared with 65 per cent. during 1935. Ten of the eleven deaths occurred in urban areas.

No deaths were recorded in the municipal towns of Madras Presidency ; no information was available for rural areas.

In 81 towns in Burma, for which information is available, 15 deaths from cerebrospinal fever were recorded.

Trachoma.

40. During 1936, out of 22,843 men who presented themselves at recruitment centres for enrolment in the Indian Army, 1,017 were rejected on account of trachoma, this number forming about 4 per cent. of those asking for enrolment and 12 per cent. of the total rejections. Amongst the causes of rejection, trachoma ranked as most important. This high rate may be due to the fact that a large proportion of the recruits to the Indian Army come from the

Punjab, where the incidence of the disease is apparently high. This is evidenced by the fact that cases treated in hospitals and dispensaries during 1936 in that province totalled 1,388,176 or more than five times the highest figure for this disease in any other province of India. The districts of Jullundur (97,885), Montgomery (97,431), Sialkot (83,756), Amritsar (71,574), and Sheikhupura (71,000) recorded the largest numbers of cases. Trachoma is a highly infectious disease which may result in serious defects of vision and in areas where it is prevalent, public health departments can usefully supplement the activity of medical departments by employing propaganda methods for educating the general population in regard to the prevention of the disease.

Trachoma was also widely prevalent in the U. P., a total of 250,597 cases being treated in hospitals and dispensaries during 1936. Of this total, 10,963 were treated in Agra district, 17,195 in Allahabad, 16,443 in Bijnor, 10, 447 in Budaun, 13,912 in Lucknow and 11,211 in Moradabad districts. Of other provinces, hospital and dispensary cases numbered 81,176 in N.-W. F. P., 13,213 in Baluchistan, 34,145 in Bihar, 3,134 in Orissa, 17,337 in Bengal, 24,483 in C. P., 22,448 in Bombay, 7,211 in Sind, 36,456 in Madras, 34 in Coorg, 402 in Assam and 17,561 in Burma.

SECTION III.

MATERNITY AND CHILD WELFARE.*

Introduction.

41. Healthy motherhood and healthy childhood are the only bases on which sound health can be built and the care of the mother and her child is, therefore, of fundamental importance to the public health. Maternity and Child Welfare work has made notable advances since its inception as a national movement in India in 1918, but there are still large gaps in the services, particularly in the field of obstetrics, which must be filled before material improvement in the health of the nation can be assured. Notable advances include the establishment of training schools for health visitors in Bombay, Madras, Rangoon, Delhi, the Punjab and the Central Provinces and the institution of a course at the All-India Institute of Hygiene and Public Health, Calcutta, for a Diploma in Maternity and Child Welfare for medical women, whereby supplies of trained workers are made possible. In addition, some 800 welfare centres have been opened in urban and rural areas where mothers can receive individual instruction and advice on the care of their own health and the health of their children. In India both of these developments are largely due to the pioneer efforts of voluntary workers whose enlightened devotion and self-sacrifice have prepared the way for further advance. It must be recognised, however, that the resources of voluntary societies are limited both in respect of funds and of personnel and that no voluntary organisation, however active and willing, can cover the whole field of work. Existing schemes, therefore, suffer to some extent from isolation, from lack of co-ordination with other public health and social welfare activities and from the lack of technical advice and guidance which voluntary societies are rarely in a position to offer. The work already done needs to be consolidated and extended, whilst more attention must be paid to the provision of midwifery service. Maternity and Child Welfare being a basic health service might well be thought to have a primary claim on public funds, but unfortunately the aims and objects of the movement are somewhat imperfectly understood and the potential benefits to the health of the community are not sufficiently appreciated. In consequence, the expenditure of public funds on maternity and child welfare is still very limited. Public opinion in this connection is a plant of very slow growth and, in the interests of the nation, the question whether expenditure of public moneys on maternity and child welfare should not be made obligatory is one which at least deserves consideration.

Maternal Mortality.

42. The penalties imposed by motherhood in India cannot yet be estimated with any great degree of accuracy. Year after year this section of the report contains a table of maternal deaths and mortality in which some of the rates are so low that they hardly merit reproduction. The following consolidated table which gives recorded figures for the past five years shows the position. Rates as low as 0·35 per 1,000 births continue to be reported from some rural areas; these obviously give little indication of the actual state of affairs.

* Prepared from a note kindly supplied by Dr. Jean M. Orkney, Director, Maternity and Child Welfare Bureau, Indian Red Cross Society.

Maternal mortality rates per 1,000 registered births.

	1931	1932	1933	1934	1935	1936 R.	1936 U.	1936 Total.
N.-W. F. P.	§	§	§	4·5*	§	§	7·5*	§
Punjab	§	§	§	§	" 1·0	0·8	4·1	1·2
Delhi	4·4	5·6	7·0	5·6	4·4	2·6	6·7	5·4
U. P.	1·2	1·2	1·0	1·4	1·4	0·4	6·9	1·3
Bihar	No information available.							
Orissa	No information available.							
Bengal	7·7	8·7	9·7	9·3	9·5	10·0	8·7	9·9
C. P.	7·3	5·8	5·0	6·8	7·9	7·3	12·6	7·9
Bombay	7·0	5·3	5·8	§	6·2	3·9	6·4	4·3
Sind						13·8	11·0	12·9
Madras	8·7	7·7	7·9	8·5	8·6	7·5	12·0	8·2
Assam†	15·7†	19·8†	17·0†	15·1†	§	0·7	1·5	§
Burma	10·4‡	9·9‡	9·2‡	4·4‡	4·5	3·5	10·2	4·3

§Not available. *For 7 towns. †For 13 towns. ‡For urban areas only.

Evidence of the wastage of life connected with child bearing can perhaps be more accurately obtained from a comparison of the death rates for males and females at specific ages. Contrary to the experience of most western countries, in India the female death rates during the reproductive ages are consistently above those for males. Tuberculosis is probably more common amongst females owing to the restrictions imposed upon them by religious and social custom, but early marriage and frequent child-bearing also enter into the picture. Apart from tuberculosis, however, the only major factor not common to both males and females is child-bearing and the rates given below indicate the risks of pregnancy in no uncertain degree. The figures for England and Wales are also given for comparison. Table J of appendix I of this report gives similar specific mortality rates for the provinces.

Comparative mortality figures for males and females taken from the Actuary's report incorporated in Volume I, Part I, of 1931 Census of India.

Age.	India—1931 Census. Males.	India—1931 Census. Females.	England & Wales—1921 Census. Males.	England & Wales—1921 Census. Females.
0	24·87	23·23	9·00	6·94
5	1·93	1·65	0·42	0·42
10	0·79	0·81	0·18	0·18
15	0·98	1·15	0·22	0·23
20	1·27	1·76	0·35	0·31
25	1·53	2·16	0·40	0·35
30	1·93	2·51	0·43	0·39
35	2·41	2·93	0·55	0·45
40	2·94	3·45	0·69	0·53
45	3·49	3·90	0·88	0·67
50	4·10	4·31	1·18	0·92
55	4·81	4·75	1·76	1·32
60	5·79	5·43	2·56	1·90
65	7·27	6·66	3·98	2·99
70	9·76	8·88	6·00	4·65
75	14·27	13·01	9·38	7·59
80	21·80	20·66	14·00	11·77
85	36·08	34·76	19·97	17·47
90	57·70	56·67	26·75	23·85

Maternal Mortality Enquiry.

43. During the year a statistical survey of maternal mortality, financed by the Indian Research Fund Association, was started in Calcutta. The survey was planned in order to throw some light on the causes underlying the large number of maternal deaths and disablements following childbirth in India and because of the almost complete absence of reliable data.

The survey was undertaken primarily to collect information on which the preventability of the maternal deaths could be assessed, to estimate the relative urgency for better antenatal care, better midwifery and better postnatal care and to enable recommendations to be made for the extension and improvement of existing services. Recommendations based on the results of an enquiry into the circumstances of individual deaths in Calcutta, however, have only a limited applicability and it is expected that similar surveys will shortly be undertaken in other areas where geographical, climatic, environmental and social conditions are different.

The Calcutta survey was commenced in the year under review and was only completed in 1937, so that discussion of the findings and recommendations made in the report of the investigation might more properly come within the scope of the 1937 report. In view of the need for improved registration of deaths arising out of pregnancy, labour and the puerperium and for improvement in the existing maternity services, it has been thought appropriate to give the available figures relating to the incidence and causes of death.

The maternal mortality rate in Calcutta for the year ending June, 1937, was 24·5 per 1,000 registered live births. It was pointed out, however, that this rate was only approximately correct owing to the defective registration of births ; to the inclusion of imported cases which, while the births were probably registered in Calcutta, might have contained a high number of abnormal cases ; and to errors which might have arisen in assigning the cause of death. The rate was similar to that estimated by Sir John Megaw in 1932, *viz.*, 24·5 per 1,000 registered births.

The causes of death found during the enquiry together with corresponding figures taken from the returns from women's hospitals in India in 1936 are given in the following table :—

Maternal Deaths—Distribution by Cause.

	Calcutta.		Hospitals.	
Abortion (septic)	33	4·71%	11	2·23%
Abortion (non-septic)	4	0·57%	1	0·2 %
Ectopic gestation	6	0·86%	5	1·01%
Other accidents of pregnancy	7	1·00%	1	0·20%
Hæmorrhage	74	10·56%	58	11·94%
Puerperal sepsis	224	31·95%	179	36·24%
Albuminuria and convulsions	126	17·97%	50	10·12%
Other toxæmias	15	2·14%	9	1·82%
Thrombosis and embolism	11	1·57%	12	2·43%
Accidents of labour and Op. Shock	26	3·71%	72	14·58%
Other	10	1·43%	8	1·62%
Anæmia	165	23·33%	88	17·81%
	701	100%	494	100%
Associated diseases	186			

Sepsis, anæmias and toxæmias together account for 80% of the total deaths. Very little is known about the toxæmias, the organisms implicated in the deaths from septicaemia, or the type and causation of the anæmias and further research into these questions is one of the present outstanding needs in India. As many as 20% of the maternal deaths covered by the survey were due to diseases associated with pregnancy, an indication that facilities for medical relief as distinct from obstetrical relief were inadequate.

Midwifery Services.

44. A circular giving the headings under which information on the maternity and child welfare services should be arranged in the annual report was drawn up and circulated to all Directors of Public Health in 1935. The headings given in the circular necessitated amongst other things a survey of the number of beds for midwifery cases and the staff employed both for institutional and domiciliary midwifery. The object of the circular was to induce public health departments to give special consideration to the needs of women and children and to provide data on which the expansion and development of these special services could be based. Unfortunately the circular has failed to achieve the purpose for which it was designed and it must be stated that the maternity and child welfare sections in the provincial annual reports, particularly those dealing with obstetrical provision, are very inadequate. The divorce of the medical and public health departments which obtains in many of the provinces in India and the lack of contact between official public health departments and voluntary associations, including missions, is probably to some extent responsible for the obvious blanks which occur in provincial health reports on the question of provision for midwifery services. Until the extent, scope and nature of the existing services are known, it is impossible even to guess at the additional number of beds and staff required, to decide as to the type and number of women who should be sent annually for midwifery training or to estimate the number of hospitals which can be used as training institutions.

During the past few years Provincial Governments have introduced legislation designed to improve the training of midwives, nurses and health visitors. These Acts should give a much needed stimulus to the movement towards better midwifery and should also ensure the early review of existing conditions. The following is a list of the Acts which have been passed, although it must be added that all have not yet been enforced :—

1. Madras Nurses and Midwives Act, 1926.
2. Punjab Nurses Registration Act, 1932.
3. U. P. Registration of Nurses, Midwives and Assistant Midwives and Health Visitors Act, 1934.
4. B. & O. Nurses and Midwives Registration Act, 1934.
5. Bengal Nurses Act, 1934.
6. Bombay Nurses, Midwives & Health Visitors Act, 1935.
7. C. P. Nurses, Midwives and Health Visitors Registration Act, 1936.

As was pointed out in last year's report, the most serious defect in many of these Acts is the absence of any clauses dealing with the prohibition of practice by the unregistered. A woman removed from the roll for negligence or

malpractices can, therefore, continue to practise midwifery without even the minimum of supervision and control exercised over her more conscientious and capable fellow-nurses. Until this defect is remedied the efforts of legislators and of individual reformers to make childbirth more safe will be robbed of much of their value.

The greatest obstacle to the prohibition of unregistered practice is the hereditary *dai*. Previous reports have drawn attention to the economic and social conditions which have cast the *dai* for an indispensable role in rural midwifery. The position is somewhat anomalous. Under the Registration Acts, the *dai* has received neither recognition nor status; at the same time, voluntary organisations, not unfrequently aided by official departments, are giving her a training and in some instances giving her employment. Within recent years, literate candidates have been coming forward in greater numbers for training, but subsequent employment is not always assured to the successful candidates. The fact is that public interest in and support for the new methods have not yet been adequately roused and the principle that skilled midwifery service is worth paying for has by no means received general acceptance. It is certain that educative processes will have to be developed much further before the indigenous *dai* is abandoned and her place, as confident and friend of the family, taken by a trained *dai* of the non-indigenous class.

Information relating to the provision of midwifery services in Bombay Presidency shows that about 70% of the confinements in Bombay City were conducted in institutions and 18% in certain rural towns were conducted by skilled attendants. During 1936 for 130,000 urban and 612,331 rural births there were respectively 210 urban hospitals with 2,436 obstetrical beds and 61 rural hospitals with 199 beds. The number of women employed in these hospitals include 88 medical graduates, 73 licentiates and 625 midwives. For domiciliary midwifery, 14 medical women graduates and 12 licentiates are employed along with 169 midwives. In Bihar with 30,087 registered births in towns and 1,113,921 in villages there are 48 urban institutions with 253 maternity beds and 32 rural hospitals with 12 beds. Seventeen medical women graduates and 48 licentiates are employed in connection with the institutions in addition to 87 midwives. A total of 79 salaried midwives are engaged in domiciliary midwifery in Bihar. These figures represent the upper and lower limits of midwifery services in the provinces; both indicate the grave inadequacy of these services and the extent to which both hospital and domiciliary midwifery staffs require to be augmented.

Apart from beds for abnormalities arising during pregnancy, labour and the lying-in period, beds are also required for women whose domestic surroundings are unsuitable. Women living in overcrowded and often one-roomed houses and too poor to obtain the minimum equipment for safe confinement form a large proportion of the total and the need in India for additional hospital accommodation is correspondingly greater than in wealthier and more advanced countries. Further, increasing numbers of women now elect to be confined in hospitals, because of their comfort, convenience and amenities, and for them also additional beds are needed. This demand is being met to a certain extent by the establishment of maternity homes, some small, some large, some well managed, some ill, some adequately staffed, some without any skilled attendant. This movement is not without risk and some control of the standards and methods of these institutions would seem to be necessary if the lives of mothers are to be suitably safeguarded.

Maternity and Child Welfare Services.

45. Maternity and Child Welfare schemes are based on a system of home visiting, of ante-natal and post-natal clinics and centres, where infants and pre-school child consultations are conducted and where demonstrations and classes can be arranged for the mothers. It is satisfactory to be able to report that each successive year shows a diminution in the number of so-called welfare centres staffed by untrained workers, where effort is limited to the distribution of free milk and clothing and to the treatment of disease. Advances in the scope and nature of the work of these centres have followed on the appointment of health visitors trained to appreciate that the primary objects of maternity and child welfare are to educate parents in the nurture of a healthy race and to prevent disease. Another major aim, namely, to collect information in regard to the health of the people and the social, economic and environmental factors influencing health is so far only partly fulfilled. Health visitors, given encouragement, are good observers, but they are rarely able to judge the most profitable line of enquiry, nor are they always able to interpret the significance of the facts which they observe, or to draw conclusions which would lead to the institution of control measures and further development of their work. The employing authority is, moreover, frequently a voluntary organisation, the members of which are not in a position to supply the technical advice required if the centres are to fulfil their triple function of education, prevention and investigation. Voluntary bodies may justly look to official medical and health departments for advice on those aspects of their work and for direction in carrying out the recommendations.

No official attempt to organise or standardise maternity and child welfare schemes has yet been made throughout India and such an attempt would probably be unwise at the moment. At the same time, some kind of central organisation would seem to be required in order to bring to the notice of provincial public health departments available information of the experience of other countries as well as that of different parts of India. On the voluntary side of the work, such a body exists in the Maternity and Child Welfare Bureau, Indian Red Cross Society. The policy of the Bureau is determined by a Committee on which are represented the medical and public health departments of the Central Government, voluntary organisations engaged in social and welfare work, the nursing profession and army child welfare, whilst its executive duties are carried out by a medical woman with technical knowledge of maternity and child welfare. The Bureau is, however, a voluntary organisation and its sphere of influence is limited to those provinces in which Maternity and Child Welfare is undertaken by branches of the Indian Red Cross Society. Only one of the provincial branches of the Indian Red Cross Society employs a medical woman to direct and supervise the provincial activities and when the size of India is remembered it will be obvious that the Bureau is severely handicapped in its efforts. Whether the work at the centre is carried out by a voluntary or by an official body, there can be no question as to the necessity for the employment of a medical officer for maternity and child welfare in each province if reasonable progress is to be made.

The organisations in the provinces were briefly reviewed in last year's report and as little change has occurred since, it is unnecessary to make further comment here.

The trained health visitor is the vital unit in any maternity and child welfare scheme, just as home visiting is the basic service for which she is responsible. If home visiting is to achieve success it must be systematic, intensive and carried out with sympathetic understanding. It is unfortunate, therefore,

that the shortage of qualified health visitors, combined with vague and erroneous ideas on the part of employing authorities concerning a health visitor's duties, frequently lead to her energies being dissipated over too wide an area and her knowledge and skill largely wasted because of the demands made upon her time for midwifery and dispensary work. If the health visitor is to have time for her legitimate duties, there must be concurrent development of medical relief and midwifery schemes.

The first training school for health visitors was established in Delhi in 1918 under voluntary auspices. At present seven health schools are at work in India, two of these being government institutions. Approximately 60 to 70 students are trained each year, a number gravely insufficient to meet existing needs. As a matter of fact only about 300 health visitors are at present employed in India, whilst the total number of births annually reaches a figure of about ten millions. One result of this shortage is that trained women are able to demand salaries out of proportion to their qualifications and the growing demand is for lower paid workers. This again involves the danger that candidates of insufficient general education will be accepted for training and for subsequent appointment in rural areas. Workers of this class might possibly be able to do useful work under the close and helpful supervision of medical women imbued with the preventive outlook or under the stimulating influence of enlightened voluntary workers, but these conditions are unlikely to be fulfilled in rural areas for many years and the demand for training courses for an inferior grade of worker needs, therefore, to be viewed with great caution. These remarks must not be taken to exclude the possibility of training women in the vernacular provided they have reached the matriculation standard and an adequate course of training can be arranged. It must be added, however, that there is meantime little demand for a training of this nature and English is the medium of instruction in all but two of the present schools.

The contributions made by voluntary organisations and individuals to the development of maternity and child welfare work have already been of great value and these will, no doubt, continue to be made for many years to come. The driving force of voluntary workers, however, sometimes needs to be directed along the most profitable channels and this is where official organisations can play a useful part. It is perhaps not too much to say that maternity and child welfare in India has almost reached the stage where it will mark time until responsibility for the training of workers and the technical direction of the work is assumed by governmental departments and until local authorities are more willing to spend money on this important branch of public health work.

SECTION IV.

PUBLIC HEALTH ADMINISTRATION.

Introduction.

46. The development of public health administration in India has been, for nearly a quarter of a century, in the direction of decentralisation. In an important resolution in 1914 entitled " Indian Sanitary Policy ", the Government of India announced that its policy was " to keep the control of research under itself, but to decentralise other branches of sanitation. " The resolution went on to say that " while the general direction of a policy of public health must remain with the Central Government, all detailed control and executive action are, and will be, left to local Governments ". This principle was incorporated in the Government of India Act of 1919, under which public health and medicine were transferred to the provinces, although the Central Government continued to be responsible for certain public health activities including India's international health relations. The Government of India Act of 1935 left this position unchanged so that the future development of public health administration in India will largely depend on the energy and enthusiasm with which provincial governments pursue an active public health policy.

Experience has, however, indicated the necessity for co-operation between individual provinces and between the provinces and the Central Government. Infectious diseases do not respect interprovincial boundaries and, to check their spread, prompt and efficient action is required both in regard to the interchange of information and the enforcement of common preventive measures. In other fields of public health endeavour, also, there is room for coordination of effort not only in respect of exchange of ideas and experiences but in the direction of reasonably uniform development. To serve these purposes the obvious method was to form a central consultative body, in whose deliberations the representatives of provincial governments and of as many Indian States as possible would participate. This was provided by the Government of India Act of 1935, and His Excellency the Viceroy in an address to a joint session of the Central Legislatures in September, 1936, announced his intention to constitute a Central Advisory Board of Health. In pursuance of this announcement the Government of India issued a Resolution in February, 1937, in which the functions of the Central Advisory Board of Health were laid down. These were—

(*a*) to act as a Central Information Bureau on all public health matters affecting India and as a clearing house for such information ;

(*b*) to advise on any matters referred to it by the Central or by Provincial Governments ; and

(*c*) to make suggestions to Government on any matters affecting public health in India to which the Board considers that Government's attention should be drawn.

The reason for the creation of the Board were set forth by the Government of India in the following words :—

" The need for periodical consultation in the framing of common policies and for the interchange of information, the result of varying experience, is greater to-day than ever before. Neither the Government of India nor the Provincial Governments can adequately fulfil their responsibilities in the domain of Public Health without taking counsel with one another from time to time ; and it falls to the Government of India to provide suitable machinery for such consultation. Their experience of its value in matters relating to Agriculture, Animal Husbandry and Education encourages them to hope that an advisory Public Health Organisation such as is described below and whose establishment was announced by His Excellency the Viceroy in his address of September 21st, 1936, to the Indian Legislature, will evoke a like measure of Provincial and State co-operation and in due course provide Federal India with a valuable forum for the discussion and formulation of Public Health policy. "

The Constitution of the Board is as follows :—

Chairman.

(*a*) The Hon'ble Member in charge of the Department of Education, Health and Lands.

(*b*) Representatives of the Government of India, not exceeding three.

(*c*) A representative of each Provincial Government who shall either be the Minister in charge of Public Health (or his deputy) or the Director of Public Health (or his deputy).

(*d*) One member elected by the Council of State.

(*e*) Two members elected by the Legislative Assembly.

(*f*) A representative of the Railways in India.

(*g*) *Ex-officio* secretary and member, the Public Health Commissioner with the Government of India.

In order to provide for the representation of Indian States and Centrally Administered areas, the Governor-General in Council has power to nominate such persons, not exceeding five, as he may think fit.

The Board held its inaugural meeting on 22nd and 23rd June, 1937, and, after discussing a number of explanatory memoranda which had been prepared for its consideration, adopted a series of important resolutions dealing with (*a*) quinine supplies in India, (*b*) the organisation of Provincial Public Health Departments, and (*c*) the development of nutritional research. The Board also set up *ad hoc* committees to report on Maternity and Child Welfare work in India and on Food Adulteration.

One of the important advances arising out of the establishment of the Central Advisory Board of Health is the formation of a Central Information Bureau, which is intended to constitute a clearing house for public health information. The Bureau will be responsible for collecting and collating information relating to health questions in India and in other countries and for the publication of suitable informatory material on different subjects affecting the health of the general population. A wealth of information exists in the annual reports of the Public Health Commissioner and in other publications relating to different health problems, such as maternity and child welfare, medical inspection of school children, control of infectious disease and so on, all of which would be of use to the people if it were presented in simple and convincing form. The cause of health education may further be helped by broadcasting on health subjects. It is also proposed that the Bureau should

issue periodical notes and reports of a more scientific nature on pecific health problems in India, these being intended for the guidance of public health workers and administrators throughout the country.

The Central Board of Health recognised that, if public health policy were to be developed on proper lines, co-ordination of effort should also be practised in the individual provinces. One of its recommendations, therefore, dealt with the formation of a Central Health Committee at the headquarters of each province and a Health Bureau in each district. Theirs should be the task of promoting co-ordinated effort in preventive medicine between the medical and public health departments.

The machinery for co-ordinating public health work in India has thus been established and, with the advent of Federation, it may perhaps be anticipated that the coming years will witness increasing progress in every phase of public health activity throughout the component parts of the Indian Empire, with the Central Government playing the all-important part of securing adjustment between individual Provinces and States.

Health Administration in the Provinces.

47. The personnel of Provincial health departments was the subject of detailed comment in last year's report. It was pointed out, for instance, that whilst the position differed to some extent from province to province, taking the country as a whole, nearly half the districts and three-quarters of the municipalities were still unprovided with qualified health officers. Little change in this position has occurred during the year under review, but until the additional health officers are appointed it is not to be expected that much progress in public health administration will be achieved.

The question of the organisation of Public Health Departments was one of the most important of those considered by the Central Advisory Board of Health at its meeting in June, 1937. After long and serious discussion, the recommendation was made that Provincial Governments should acquire powers, if necessary by legislation, to form Provincial Public Health Services and to require each municipality and district board to have its own qualified health officer. It was also recommended that governments should exercise control of their health services by laying down suitable conditions for the qualifications, recruitment and terms of service of health officers. In addition, the Board expressed the opinion that, both in regard to the provision of public health services and public health schemes, provincial governments should encourage local bodies by the distribution of percentage grants-in-aid from provincial funds. It was considered that a wise distribution of grants not only encouraged local progress but enabled provincial governments to exercise greater supervision over local authorities in regard to their public health activities. The remarks of the Indian Statutory Commission in this connection are pertinent:

" The system of grants-in-aid has done much in our own country to stimulate the development of particular services, but such grants are generally made conditional on the imposition of adequate taxation and the acceptance of a considerable measure of central control by the local authorities themselves. In India, the giving of grants, often unconditionally, to local authorities has gone so far as to divorce control of policy from financial responsibility. In Bombay, government grants amounted to nearly 60 per cent. of the revenue of District Boards." On the other hand a judicious use of grants-in-aid adds greatly to the Provincial Government's power to control the administration of local bodies. The Statutory Commission stated, " It is significant that, where, as in Madras, the authority at the headquarters of the province has made use of a system of specifically earmarked grants-in-aid to keep a controlling hand on district board administration, the fall in efficiency has been far less. "

With the introduction of autonomous government in the provinces and the transference of power to Ministries responsible to the electorate, there seems to be a new opportunity for the furtherance of an active public health policy. Legislative sanction, where this is necessary, for the recruitment of public health personnel should be more easily obtained, whilst the enforcement of a healthy measure of control over the administration of local authorities should evoke less opposition. The time seems ripe, therefore, for the introduction in each provincial legislature of a consolidated Public Health Bill covering the whole field of health activities and of such administrative measures as would ensure the provision of qualified health staffs both for urban and rural areas.

Rural Health.

48. The problem of rural health deserves special consideration. According to the 1931 Census about 89 per cent. of the total population of India lives in rural villages. The health of the villagers is therefore of vital importance to the country, because from the economic point of view alone, since agriculture forms the staple industry, the health and well-being of the peasant largely determines the prosperity of the nation. In the past, perhaps, a disproportionate portion of available funds has been devoted to urban improvement, but it has within recent years been increasingly realised that the villager is in urgent need of assistance. Rural development schemes of different varieties have been started under governmental and other auspices in various parts of the country, but so far these have only touched the fringe of the problem, which is one demanding the highest form of statesmanship.

From the point of view of public health, the problem of the Indian villager presents many difficulties. The scattered nature of the population and the extensive areas that have to be covered render it difficult to provide an adequate staff for the efficient discharge of health functions. Even the provision of elementary requirements of environmental hygiene, such as a safe water supply and satisfactory disposal of night soil, constitutes a financial task of no small magnitude. In addition, the villager is usually strictly conservative in his outlook and the inculcation of health habits, in so far as they depart from his normal modes of life, can only be achieved by long and patient endeavour.

It is obvious that no solution of the rural health problem can be reached without careful study. In order to demonstrate what can be achieved by a properly equipped health organisation, within recent years, a number of experimental schemes in limited areas have been tried out in different parts of the country. In most cases these have been assisted by generous grants from the Rockefeller Foundation and India is deeply indebted to that organisation for help in her efforts to promote the public health. For example, in Madras Presidency, two years ago a small area with a population of about 42,000 and consisting of 25 villages in Sriperembudur Taluk of Chingleput district was selected. This Health Unit, which has its headquarters at Poonamallee, about 13 miles from Madras city, is controlled by an Advisory Committee, consisting of the Revenue Divisional Officer as Chairman, the Health Officer as Secretary and the Presidents of the village Panchayats, a representative from each of the non-Panchayat villages and a representative of the Rockefeller Foundation as members. The scheme of health work in the area is financed partly by the Madras Government and partly by the Rockefeller Foundation.

The staff consists of a Medical Officer of Health, a woman Medical Officer in charge of Maternity and Child Welfare, four Sanitary Inspectors, four Health Visitors and eight Midwives, who are individually and collectively responsible for all aspects of public health work in the area. The extent of the progress which has already been made can be judged from the following brief review of the Unit's activities during the 15 months which have passed since its inauguration.

A preliminary survey of the 8,017 houses in the area was the first task and this survey provided valuable information regarding housing and environmental conditions. Householders were advised in regard to the improvement of sanitary defects, follow-up visits being paid to 2,716 houses to ensure that the advice was acted upon. Clearing of backyards, removal and disposal of rubbish and manure heaps, prevention of mosquito breeding, provision of windows, white-washing of houses and the general cleanliness of environment constituted the main lines of attack. A reasonable measure of response was received from the villagers to these ameliorative efforts of the health staff.

In addition, other health questions were investigated. A malaria survey disclosed that the disease was not endemic in any of the villages; on the other hand, a hookworm survey showed that infestation was as high as 77·4 per cent. and mass hookworm treatment was therefore instituted.

Another direction in which improvement was recorded was with respect to the registration of vital statistics, accurate statistical records being the basis for the estimation of all health progress.

Encouraging advance was also recorded in the field of maternity and child welfare. As the recorded birth rate, under improved registration, was found to be 46·4 per mille, the number of births in the Health Unit area should have been something under 2,000. During 1936, 225 clinic sessions were held and these were attended by 887 expectant mothers, 1,665 infants and 584 pre-school children. It is obvious, therefore, that a high proportion of the infants in the area were actually brought to the clinics. Another useful activity was the home visiting done by the health visitors and midwives. These visits made it possible to register cases of pregnancy and to keep a watchful eye on expectant mothers, on infants and on pre-school children. As many as 55 per cent. of the total confinements were conducted by the midwives, who also paid 8,120 natal visits and the infantile mortality rate dropped from 274 per 1,000 live births in 1935 to 162 in 1936. The Director of Public Health states that "the people have begun to appreciate the need for skilled assistance at confinements and there was a large demand for the service of the midwives. The present staff is not adequate to cope with the work."

Drinking water supplies were dealt with satisfactorily. All public wells after being cleansed were chlorinated once a week. A programme for the construction of deep bore wells was prepared and the Chingleput district board and the Poonamallee *panchayat* board sanctioned Rs. 5,000 and Rs. 250 respectively for this purpose.

Medical inspection of school children was carried out in various schools in the area; of 1,409 pupils examined, 783 or about 55 per cent. showed one or other defect. There was apparently no special provision for treatment and they were advised to go for that to the nearest hospital. Personal prophylaxis received attention by the carrying out of anti-cholera and T. A. B. inoculations and by vaccinating or revaccinating the population.

Special attention was devoted to imparting information on health subjects. The home visits and the clinics afforded opportunities for teaching mothers, whilst lectures and demonstrations in schools, cinema shows, magic lantern lectures, radio talks and exhibitions enabled the health staff to carry the message of health to every section of the community.

From this brief description of the activities of a Health Unit, it will be realised that an organised attempt is being made to combat the problems of ill-health in a rural area and that considerable success seems likely to be achieved. Similar units are at work in Partabgarh in the United Provinces, in Hlegu in Burma and in Najafgarh in Delhi Province and it is hoped that others will shortly be organised in Bengal and in the Punjab. Apart from the actual benefits they confer on the populations concerned, these organisations serve as demonstration centres and they also afford excellent opportunities for the field training of public health workers and students.

The health problems of the villages cannot, however, be solved by public health measures alone. Almost every aspect of human activity has a bearing on health, so that no scheme for rural development can be considered adequate unless it provides for a many-sided attack on the physical, social, economic and educational aspects of village life. To serve this purpose, all departments of government,—Public Health, Medical, Education, Industries, Agricultural, Co-operative and others,—must take co-ordinated action. One method of promoting co-operation might be the formation of a Rural Development Council at the headquarters of each province, with a district council for each district; on both, every department concerned would be represented. As regards finance, it would seem only reasonable that a percentage of provincial revenues should be specially set apart for rural improvement and made available in the form of grants-in-aid on the condition that each district contributed from its own funds. This method of financing improvement is one which has been widely practised in other countries and ensures an adequate measure of central control and supervision over expenditure on approved schemes. Only by some such comprehensive plan developed over a long period of years will enduring results be obtained, because experience of social reform all over the world has demonstrated the futility of short-term efforts. Particularly is this true in relation to health because improvement of individual and communal health involves, in many cases, radical changes in methods of living. Acceptance of new habits by a community, indeed, can often only be attained when a new generation has grown up in an environment of new ideas and new practices.

In order to help Provincial Governments in financing schemes for rural development the Government of India sanctioned, during the past three years, two grants of Rs. 92½ lakhs and 103 lakhs respectively. The programmes of expenditure showed some variation from province to province but everywhere public health measures claimed a large share of the money, including rural water supplies, rural sanitation and antimalarial operations. Village communications also received attention, while agricultural and veterinary schemes were supported in some provinces. Other ameliorative measures included rural broadcasting, the encouragement of industries like tanning, coir spinning and weaving and the provision of playing fields and recreation grounds for villages and village schools.

What should constitute the minimum standard of sanitary requirement for a village ? The Director of Public Health, Punjab, has suggested the following criteria for what he terms a " sanitated " village.

(*i*) A water supply adequately protected from surface contamination ;

(*ii*) Drains for the removal of waste water ; and

(*iii*) Regular removal of filth and refuse outside the village to a place prepared for their reception.

According to this standard, which cannot be considered to be at all high, out of a total of 35,871 villages in the Punjab only 382 villages in 27 districts, or one per cent., merited the title. On the other hand, it is to be noted that in one district which was given a special Government grant of Rs. 8,829 for sanitary works, 336 villages reached this minimum standard. This is significant of what could be done if money were available.

One interesting feature of the rural improvement campaign in the Punjab is that the villagers have begun to take part in it themselves and to contribute towards its cost. The Director of Public Health remarks that " no less than a sum of Rs. 1,12,295 was voluntarily subscribed by 887 villages for sanitary work, and in addition, in 592 villages contributions in labour and material were made. There were some 200 more villages in which unrecorded sums of money were subscribed. " He goes on to say that real interest had been awakened and this raised the hope that many improvements which in the past (after considerable time and money had been spent on them) had been allowed to lapse, might now, with the villager himself a shareholder, not only be maintained but extended.

In the United Provinces the year 1936 is stated by the Director of Public Health to have been one of intense activity from the point of view of rural development. The Government of India grants during 1935 and 1936 were utilised in two directions :—

(1) the " main " scheme, worked by district officers, under which programmes of general economic improvement of villages and village conditions were aimed at and for which the co-operation of all other departments of Government was obtained through the co-ordinating medium of the district officer ; and

(2) " departmental " schemes, under which each department carried out its own improvements in smaller selected areas in order to demonstrate the value of intensive work in particular directions.

As regards the ' main ' scheme for rural development the Public Health Department co-operated with other departments in carrying out measures relating to public health. A description of the work taken from the 1935 annual report of the Director of Public Health, United Provinces, may be quoted :—

" Village officials, school teachers and older boys are being trained in hygiene and first aid. To keep village sites clean and also to increase the available manure and conserve its quality, rubbish, litter and dung are being stored in pits. To keep village paths dry, soakage pits for demonstration purposes have been constructed for the reception of waste water. Screened trenches have been constructed for women, to serve as latrines. The advantage of providing such latrines is that they are fool-proof and the trenched excreta can be dug out in six months as excellent manure. Urinals have been provided separately for men and women near inhabited sites. People have been advised to provide smoke outlets in kitchens and to remove cattle-sheds to the back of their houses. Screened bathing platforms draining into large soakage pits, have

been constructed at a small distance from wells, to prevent their contamination. Parapets and pulleys are being provided on wells. Excavations are being discouraged. Villagers are being trained in anti-epidemic work. Indigenous dais are being trained in clean aseptic methods."

A portable dai's box has been designed by the public health department. These contain simple articles necessary for conducting labour cases cleanly and also printed instructions in English and the vernaculars. The cost of each box is Rs. 4. A large number of such boxes has been issued.

The village chaukidar is being trained in the identification of the common diseases. Junior Red Cross groups have been started, which play health dramas, chant songs and help in popularizing anti-epidemic measures. Suggestions have been made for the supply of sprouted grams, fruits or vegetables as midday meals in village schools.

"Medical aid for minor ailments has been provided as part of the programme and the public health department has designed medicine boxes containing simple indigenous drugs of known therapeutic value, most of which are available in villages. Printed instructions in English, Urdu and Hindi containing the prescriptions and mode of administration of the drugs have been supplied with each box. These medicine chests are kept in the charge of village school teachers or other responsible persons. The cost of each box is Rs. 10." Under this 'Main scheme' improvement work was carried out in 72 villages in each of the 45 plains districts of the province.

In the U. P., the Health Unit which has been working in Partabgarh for the past six years has given encouraging results. The scheme is partly financed by the provincial government and partly by the Rockefeller Foundation. The Unit has a staff which includes a medical officer of health, four sanitary inspectors, a medical woman, four health visitors and eight midwives.

Other directions in which improvement of rural health was attempted included the training of school teachers, *patwaries*, constables and village *chaukidars* in elementary hygiene, first-aid and anti-epidemic work; the provision of 'village-aid' dispensaries; the construction of 'model houses' in villages; and improvement of existing houses by the provision of ventilators, etc.

These descriptions of the chief aspects of rural health work in the Punjab, Madras and the United Provinces have been given as examples of what provincial governments are attempting. But so far the fringe of the problem has hardly been touched and both sustained and patient efforts are necessary before permanent betterment of the village environment is made evident. No health schemes can be carried through without money and the stimulus which has been given by the recent grants from the Central exchequer may, it is hoped, result in further expenditure from provincial and district revenues.

School Medical Inspection.

49. *Medical examination of school children.*—A school medical service is one of the most important parts of public health administration. Experience all over the world has shown that the provision made for the health of the school child, by periodical examination and the correction of defects, has proved to be a sound investment in respect of betterment of the national health. In England the school medical service was developed in 1908 and since then the benefits conferred on the rising generations have contributed in no small degree to a general raising of the nation's standard of health. As experience was obtained, the scheme expanded in various directions. For example, the recognition of important health problems among those of school-age resulted in the organisation of special preventive measures

such as the campaign against rheumatic fever, the inauguration of a dental service and the provision for education and treatment of mentally deficient children. In another direction, the conception of health service was widened so as to include even the social upbringing of the school child. The popular institutions known as school camps may be looked upon as an integral part of this wider conception of health, whereby children from the poorer sections of the community are given opportunities of escaping for a time from the sordidness and squalor of their ordinary environment, of living on terms of equality with the children of more prosperous parents and of acquiring such cultural advantages as this contact might confer. To quote the words of a writer in the Times Educational Supplement,* "In the school camp of today, particularly in the camp where most of the children come from working-class homes, there is opportunity for social work of the highest order. For our educational system merely to teach the children it deals with in such large numbers is almost a crime. It offers to intellect and character the chance to rise from what our forebears called their "station in life", but it cannot substantiate that offer unless it is prepared to do more than train the mind and body through class-room and playing-field activities. Every one who has studied educational problems of to-day can envisage the pitiful case of the brilliant young scholar who cannot take his place in the world because he lacks entirely, or almost entirely, the background and the traditions of the circle he would, and could, enter."

"The problem is no superficial one; it goes right to the very foundations upon which our civilization is built. For centuries in England the tradition of the leader in every branch of life has been one of devotion to duty, of courtesy, of tact, of cheerfulness under trying conditions, of giving obedience and exacting it; of making subordinates feel happy, of cleanliness in body and in mind. In these children whom we are now inviting through our educational system to take their place, if their abilities warrant it, among the leaders of our nation and of our civilization, every shade of this fine tradition is to be detected, but it is blurred by a mass of other and undesirable tradition, the result of environment and upbringing. It is blurred by poverty, by bad housing, by lack of the amenities which make life beautiful." These are considerations which should guide the development of every health service in relation to school children, because the idea underlying all public health endeavour is to give to the individual opportunities for a fuller and richer life.

Apart from such cultural advantages, however, the safeguarding of the health of the school child is the best way of ensuring the health of the adult members of the community. In India, the school medical service is one of the most backward of the public health services. In some provinces nothing at all is being done and, even in the provinces where a scheme exists, its operations are restricted and are not carried out on any uniform basis. The information to be obtained from provincial public health reports is not, therefore, comparable from province to province. The figures presented in the following table give some idea of the relative frequency of a few of the more important defects found in the school children in certain provinces.

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* Quoted by Sir George Newman in "The Health of the School Child for 1928".

Percentages of school children presenting defects among total numbers examined (1936).

	Malnutrition.	Skin diseases.	Defects of vision.	Enlarged tonsils and adenoids.	Dental caries.	Enlarged cervical glands.
N. W. F. P. (5 principal towns) ..	..	0·9	2·4	5·0	8·0	..
Delhi—						
Boys (*a*) Urban . .	7·5	0·9	11·7	31·1	7·3	16·7
(*b*) Rural . .	3·7	1·4	2·8	3·6	6·0	0·6
Girls.—Urban . . .	1·5	0·4	0·2	7·3	8·0	0·7
U. P. (*a*) Urban . .	17·6	3·0	14·0	12·0	10·4	3·7
(*b*) Rural . .	17·5	3·4	1·3	2·0	10·7	1·8
Burma	..	2·8	5·3	15·9	24·4	..
England and Wales (1933) .	1·1	1·0	8·1	4·0	68·5	..

Enlarged tonsils and adenoids, defects of vision and dental caries stand out as important defects. For the United Provinces and Delhi the figures are shown separately for rural and urban areas. The disproportionately high urban rates, as compared with rural rates, for defects of vision and enlarged tonsils and adenoids are striking. Dental caries shows no marked difference in incidence between rural and urban areas. This defect is definitely high in Burma but in every province, its percentage incidence is sufficient to demand action on the part of the health authorities, especially when it is recalled that these figures refer to young children in many of whom the defects exist in the milk teeth and in whom therefore the carious condition may later affect the permanent teeth. The figures for malnutrition are of doubtful statistical value. In the absence of definite objective standards for assessing the state of nutrition, and with the assessment carried out by different medical officers, results are bound to show a considerable range of variation.

During the year under review schemes for medical inspection of school children unfortunately were in abeyance in Madras and Bombay Presidencies. In Assam the Director of Public Health states that "periodical medical inspections of selected institutions were carried out and recommendations made for the improvement of the health of the boys and girls". In the North-West Frontier Province, in Bihar and in Orissa, the percentages of children presenting defects requiring medical treatment were 32, 43 and 52 respectively. In the Punjab, medical inspection of children in boys' schools was most successfully carried out in the municipalities of Sialkot and Jullundur where a satisfactory system of inspection in secondary schools is financed by charging a monthly fee of two annas per pupil. In six other towns schemes for the medical inspection of the pupils in girls' schools were provided under the auspices of the Junior Red Cross.

Provision for the treatment of defects discovered during medical inspections varied greatly from province to province and in no instance could existing schemes be considered adequate. As regards Delhi province, the Assistant Director of Public Health states: "The organisation existing until the end

of the year for preventive work among school children was confined to their medical inspection twice a year, leaving the treatment of any defects found amongst them largely to parents or to the school masters. No arrangements whatsoever were made for following up the cases ". It is pleasing to be able to report that a comprehensive scheme is under consideration in which provision will be made for the establishment of school clinics. The whole scheme is estimated to cost approximately Rs. 28,000 per annum, but it is proposed that at the different local authorities should make substantial contributions towards this total. As regards New Delhi, the scheme has been accepted and provision has been made for the creation of two clinics and the part-time employment of ophthalmic and dental specialists.

In the United Provinces, provision for treatment was made through school clinics and, in their absence, by referring patients to the existing urban and rural dispensaries. The Director of Public Health states that " the school clinics touched only a small fringe " of the problem. In regard to the other dispensaries, in the urban areas, out of about 50,000 school boys only 2,700 received treatment and, in the rural areas, only about 2,000 out of a total of 70,000 pupils. Defective vision received special attention and 455 pairs of glasses were supplied free to indigent boys. In Bihar and in Orissa, parents were informed of the defects discovered and were advised to consult their own medical attendants or to take their boys to the nearest hospital or dispensary. The same method was practised in Burma. In the North-West Frontier Province, of 14,871 children recommended for treatment 12,784 or 86 per cent. were said to have received treatment. In the Punjab, under the auspices of the Junior Red Cross the scheme of examination of school girls provided for free treatment by women doctors at municipal and mission women's hospitals and at the women's section of civil hospitals.

The nutritional state of school children.—In some provinces the nutritional state of school children was the subject of investigation and experimentation. Experiments carried out in India and abroad have demonstrated that milk is a valuable addition to the diet of growing children. In South India, Dr. Aykroyd's experiments showed that groups of children given a daily ration of skimmed milk in addition to their usual diet exhibited higher rates of increase in weight and height as compared with other control groups who were not given the milk. During a period of three months the average gain in the weight of boys, given daily eight ounces of liquid milk prepared from one ounce of skimmed milk powder, was more than twice that of boys who received no milk supplement to their diet. In a girls' hostel, a daily ration of twelve ounces of similarly reconstituted liquid skimmed milk produced, during the same period, an average gain in weight which was about six times that of the control group. It is satisfactory to note that attempts have now been made to supply milk to school children in several provinces.

In the United Provinces, schemes for the free supply of milk to ill-nourished and poor children were put into practice in Agra, Lucknow, Cawnpore, Allahabad and Benares. In Cawnpore, 150 boys were each given a quarter seer of milk in the middle of each working day. The Director of Public Health reports that, " although the data are meagre, yet it is noteworthy that there was on an average increase of 2·7 lbs. in weight per head in three months' time as compared with an average increase of 1·0 lb. per head in the control group. In one school the milk was discontinued after three months and a marked fall in the average gain was noticeable, the gain being only 0·2 lb." Comparability of control in experimental groups is likely to be

disturbed by variations in the age of the boys composing the groups but on this point, no information is available. The fact that discontinuance of the milk caused a marked fall in the average monthly gain in weight suggests, however, that this addition to the diet was responsible for the increase of weight.

In the North-West Frontier Province a scheme for providing four *chattacks* of milk per head was introduced in all the schools in Peshawar. Midday meals were also served in some schools to needy children.

In Delhi City, experiments in the feeding of school children were made in certain selected schools attended by poor children. Milk, *chappatis* and fruit were provided at municipal expense, each child getting approximately 8 ounces of milk, an ounce of sugar, a *chattack* of ata and a quarter *chattack* each of ghee and *dhal* cooked with *masala*. Unfortunately no records of weight and height were kept, but it was generally agreed that the pupils benefitted greatly and that they looked better and more lively. In Bihar a scheme for providing midday lunch to the children in some schools in Chota Nagpur Division was reported to have worked well.

Sanitation of schools.—In every province, the public health staffs are reported to have carried out inspections of schools and their premises for the improvement of general sanitation; ventilation, water-supply, latrine accommodation and other matters also received attention.

Control of Medical Inspection.—In respect of the control of medical inspection work, there seems to be little or no uniformity of practice; in some provinces the medical department is responsible, in others the public health department and in others the education department. In the interests of efficiency, it would seem essential for all these departments to work in close co-operation and this can best be achieved by the heads of these three departments preparing a joint scheme for the guidance of all concerned. In actual practice, however, it is desirable that a single officer should have administrative control. By following the example of England, where the Chief Medical Officer of the Ministry of Health is also the Chief Medical Officer of the Board of Education, the Director of Public Health of each province would be the controlling officer, but he should in every case act in close consultation with the heads of the Education and Medical Departments.

Fairs and Festivals.

50. The importance of the sanitary control of pilgrim centres as an essential part of a campaign against infectious diseases cannot be over-emphasised. The provision of adequate arrangements at places of worship, where large numbers of people congregate, is equally necessary from the point of view of the comfort of the pilgrims. This matter received attention at the hands of the Government of India as early as 1912, when they invited Provincial Governments to undertake comprehensive surveys of the pilgrim centres within their areas of jurisdiction. Provincial Pilgrims' Committees were entrusted with the task, the Public Health Commissioner with the Government of India being the Chairman. Detailed investigations were made and proposals were submitted by each committee, although some time elapsed before it was found possible to take action on their recommendations.

With the 'transfer' of public health to provincial control consequent on the Government of India Act of 1919 and with the strengthening of public health staffs, this subject has received increased attention at the hands of almost every provincial Government. Elaborate and efficient arrangements

are now commonly made for such large gatherings as the Kumbh Melas in Hardwar and Allahabad, for the Solar Eclipse festival at Kurukshethra in the Punjab and for the Pushkaram and Mahamakam festivals in Madras Presidency. On these occasions special committees are formed, which include representatives of the Public Health, Revenue, Railway and other departments of Government as well as of local authorities and it has been usual to confer special powers on these committees by invoking the provisions of the Epidemic Diseases Act. Within recent years the sanitary control measures in force have, in fact, reduced to a large extent the danger of explosive outbursts of cholera, which were previously the common sequel to many of the major festivals in the country. Nor have places of perennial pilgrimage escaped notice. At many centres the supply of protected water, the provision of drainage and the quick disposal of nightsoil and refuse have gone far to reduce the dangers to the health both of the pilgrims and of the general population, although much remains to be done in these and other directions before safety from serious epidemic outbreaks can be assured.

The contiguity of Indian States to British Provinces and the pilgrim traffic which takes place between them make it also necessary that there should be close co-operation between the States and Provincial authorities in regard to the health control of melas and fairs occurring in either territory. For this purpose arrangements have been made for the interchange of information in regard to epidemic disease outbreaks between individual Provinces and States. The Public Health Commissioner with the Government of India is one channel by which this information is distributed, but in order to avoid any delay the Directors of Public Health of neighbouring Provinces and States have been advised to exchange information direct and it is hoped that this practice will be widely extended in coming years.

A brief review may now be given of the festivals that took place in the provinces during 1936. In N. W. F. P., Delhi, Bihar, C. P., Sind and Assam no fairs of importance were held.

In the Punjab, the Director of Public Health reports that a routine practice has been established for the organisation of public health measures in festival areas. " The provision of an adequate number of sanitary conveniences and sanitary personnel for their control, the protection of food-stuffs exposed for sale and the elimination of unsound articles, the establishment of accommodation for the isolation of cases of infectious disease and the following up of contacts,—all these and other matters essential for the health and comfort of those attending fairs and for the protection of the community generally from the dangers which may arise when large numbers of people are congregated together, receive attention ".

The outstanding event of the year was the Solar Eclipse Fair held during June, at Thaneswar, which was attended by approximately 350,000 pilgrims. On this occasion the elaborate arrangements made were most successful; except for the occurrence of three imported cases of cholera, no untoward event occurred.

In the United Provinces, the most important gathering was the Adh Kumbh mela at Allahabad, which lasted from 1st January to 14th February. This is a festival which attracts pilgrims from all over the country, the attendance on the most important day reaching a total of nearly two and a half millions persons. Not only were careful preparations made at the *mela* site, but supervision of the import and export of infection was effected by the

medical inspection of pilgrims, whilst temporary regulations under the Epidemic Diseases Act were also enforced. Eight attacks and 6 deaths from cholera were recorded, but it is gratifying to note that the festival passed off without any other serious outbreak of infectious disease. In addition to the Kumbh Mela, a large number of other but lesser festivals were celebrated in this province.

The organisation and supervision of sanitary arrangements for the major festivals were as usual carried out by Assistant Directors of Public Health whilst those of lesser importance were controlled by the local public health staffs. Except for four cases of smallpox at each of the two festivals at Hardwar, Mahabarni and Dikauti, and of four cases of cholera and one of chicken-pox during the Ram Naumi festival at Ajodhia, no other infectious disease cases were recorded at any pilgrim centre.

The most important festivals in Orissa were Snan and Rathjathra festivals at Puri, which took place during June. In addition to the normal population of about 38,000, approximately 75,000 pilgrims were present. Every precaution was taken to prevent the spread of cholera, as sporadic cases of the disease were being reported during June both from Puri town and Puri district. The incidence of cholera during the *mela* was, however, low, the total number of cases being only 24 against 44 during the preceding year.

In Bombay Presidency, the largest gathering occurred at the Ashadi Fair which took place at Pandharpur in June. The attendance fell from 176,897 in 1935 to 91,267 because of the prevalence of cholera at Pandharpur and in the surrounding villages. Under the provisions of the Epidemic Diseases Act, the Government issued orders that persons failing to produce evidence of having been inoculated against cholera should be prohibited from entering the municipal limits of Pandharpur. This order was generally effective for, of the 91,267 pilgrims who entered the town, about 93 per cent. were inoculated, whilst a majority of the remainder produced certificates of inoculation. About 40 per cent. of the inhabitants of the town were also inoculated. The other preventive measures against cholera were so successful that, in spite of the prevalence of the disease both in the town and in the surrounding area during the fair, dissemination of infection was reduced to a minimum. Information collected with care through the revenue authorities showed that only 17 cases occurred among the returning pilgrims although it must be added that these cases took place in ten towns and villages in different parts of Bombay Presidency and the Central Provinces. Of these 17 persons 8 were not inoculated.

In the Central Provinces no epidemic diseases were reported at any of the fairs except at Markanda fair in Chanda district, when cholera broke out. The infection was said to have been imported from Hyderabad State.

In the Madras Presidency, the sanitary arrangements at all fairs and festivals were supervised by the district health officers and by health or sanitary inspectors. Except for a few cholera cases all passed off uneventfully. Many festival centres have not yet been provided with protected water supplies and as drinking water plays an important part in the dissemination of cholera, a priority list of the villages, where this was an urgent need, was drawn up by the District Health Officers in consultation with the Presidents of District Boards and District Board Engineers.

In regard to the importance of minor festivals, the Director of Public Health states :—

"On account of the small gatherings they attract, minor festivals are often overlooked by the controlling authorities with the result that sometimes they have become foci of widespread cholera epidemics. The Roman Catholic festival at Kohur in Tanjore district where no sanitary arrangements were made, was responsible for the spread of cholera in the district. Sapthagam is another instance of a local feast in Rajampet taluk of Cuddapah district which disseminated cholera infection in a large number of villages. In view of the above the local bodies have been advised to make in consultation with the District Health Officers suitable arrangements even in the case of minor festivals particularly in regard to protection of water supply and efficient conservancy."

For the adequate control of festival centres it is essential to draw up a carefully considered plan of improvements. Every perennial centre of pilgrimage should possess a protected water supply, suitable drainage and other sanitary amenities, whilst the maintenance of an adequate health staff for continuous sanitary control is also essential. In regard to less important centres, these may be divided into two classes, those which have festivals on one or more occasions annually and those in which the festival occurs only at intervals of some years. For the former the sanitary arrangements should obviously be of a more permanent nature than for the latter. Each local authority should, in consultation with its health officer, make a survey of the festival centres within its area of jurisdiction and should formulate the measures essential for the health, safety and convenience of the pilgrims. These measures will vary in cost with the importance of the festival and the nature of the centre at which it is being celebrated. For the smaller towns and villages, piped water supply schemes are probably not possible and suitable protected wells should ordinarily suffice, provided that during the festival period arrangements can be made for pumping the water to conveniently situated cisterns. The possibility of providing tube wells should also be explored.

In many festival centres, the local authorities might with advanatge tap certain sources of income which will provide the funds for the carrying out of all necessary improvements. For instance, in Madras Presidency, cattle fairs are associated with many of the festivals and a small fee levied per head of cattle should bring in considerable revenue, The licensing of vendors of articles of food also gives another source of income, with the further advantage that by means of conditions attached to the licenses, a suitable measure of control is obtained over the preparation and sale of food supplies. Similarly, the licensing of other shops, which always spring up at festival centres, can be made a source of revenue. Further, the authorities of the temples, with which the festivals are associated, should all be able to contribute towards the provision of comfort and conveniences for the pilgrims, from whom the temples derive their income. In Madras Presidency, a provision in law exists under which temple authorities are compelled to bear a part of the cost of sanitary and other amenities ; similar legislation would probably be of equal advantage to other provincial authorities in their efforts to improve conditions at their festival centres.

Health Propaganda.

51. The spread of knowledge in respect of health is a well recognised function of all modern public health administrations. In the words of Sir George Newman : "As in the individual, so in the community, knowledge is the sheet anchor of preventive medicine, knowledge of the way of life, knowledge of the causes and channels of disease, knowledge of remedy." The fact is that little progress in social amelioration can be made by thrusting compulsory

public health improvements on an unwilling community and, in order to obtain the active co-operation of the people, health education is essential. It is to be noted, however, that the art of healthy living imposes on the individual a double discipline—the unlearning of undesirable habits and the acquiring of others beneficial to his well-being. The fulfilment of these purposes demands understanding of the principles involved and that can only be attained by an educative process which is difficult of application to the untutored adult mind, although it is more likely to be successful with the younger generation. The State may provide elaborate health services, but the people, through ignorance or suspicion, may refuse to avail themselves of these services or make insufficient use of them. This can only be corrected by carrying on an unceasing education campaign among both young and old.

To carry out such an education campaign to a successful issue, two weapons must be provided :—(1) a body of simple and clear facts concerning personal health, and (2) a practical demonstration of hygienic principles and methods. Only by the utilisation of these essential weapons in the fight against ignorance will it be possible to instil in the individual the habits of healthy living. "All our life, so far as it has definite form, is but a mass of habits—practical, emotional, and intellectual—systematically organised for our weal or woe, and bearing us irresistibly toward our destiny, whatever the latter may be." Although the adult must by no means be neglected, it is education of the youth of the country which will give the most certain results. The formation of sound habits in childhood and adolescence will provide a stable foundation on which the superstructure of national health can safely be built.

Under modern conditions numerous methods are employed in health propaganda work. Posters, leaflets, health exhibitions, health songs and dramas can all be made to carry convincing messages to the people, whilst an even wider range of education is provided by the cinema and the radio. It is satisfactory to note that most provincial health departments have, within recent years, taken an increasing interest in this part of their duties. In every province, both rural and urban health staffs, as a part of their routine duty, carry out regular programmes of health talks, many of these accompanied by magic lantern demonstrations and on rare occasions assisted by films. In many instances, also, advantage is taken of the favourable opportunities afforded by markets, melas, fairs and festivals, although it is now not unusual to find that posters and leaflets fail to excite any great interest. This may perhaps be due to the frequently unattractive form in which these are prepared and health propaganda officers should always be ready to adopt fresh ideas and new methods if their work is to be effective. In some provinces, demonstration vans and motor lorries fitted with posters, lanterns, screens and projectors have enabled work to be extended to large numbers of rural villages. Health films are, however, still few and far between and it is to be hoped that Directors of Public Health will do all in their power to extend the use of this attractive form of health propaganda. In the following paragraphs a brief description is given of the health education campaign in the provinces.

In the Punjab, the Epidemiological Bureau is the centre at which propaganda material is planned and prepared and from which posters, leaflets, pamphlets, photographs and models are issued. A special feature was the intensive health campaign carried out in connection with hookworm. A new pamphlet on food and another set of slides on tuberculosis were prepared.

A Hygiene Publicity Bureau was maintained in the United Provinces. The provincial branch of the Indian Red Cross Society utilised a demonstration van equipped with a dynamo, health films, loud speakers, posters and gramophone records. By means of this van, 70 cinema shows were organised for audiences totalling 170,000 persons. During the Ardh Kumbh fair a health exhibition was held for a period of one month, one of the special features of which was the lay-out of a model village. A health demonstration stall was included in the provincial industrial and agricultural exhibition.

The United Provinces branch of the Indian Red Cross Society established 4,576 junior Red Cross Groups comprising a membership of 100,810 in 3,416 schools. The activities of these groups included the teaching of sanitary habits and practices and the recording of monthly weights, height and chest measurements. The St. John Ambulance Association awarded to school children 2,107 pass certificates for the Mackenzie School Course in sanitation and first-aid.

A small Public Health Propaganda Bureau was maintained in the office of the Director of Public Health of Bihar. Exhibitions organised during fairs and festivals were utilised for the distribution of literature and articles on health subjects were contributed to the local press. Illustrated lectures on public health subjects were given as before to the cadets of the Police Training College at Hazaribagh and also at a special course organised by the Co-operative Department for the training of rural welfare officers. In addition, the Assistant Directors of Public Health gave similar lectures during their vaccination inspection tours in rural areas. A health museum was maintained and was visited by about 133,000 persons.

In Orissa, health propaganda is considered to be one of the routine duties of district health staffs. These officers delivered lectures at different centres throughout the year, whilst leaflets and pamphlets were distributed particularly during the periods of cholera and smallpox epidemics. Health weeks were celebrated in the districts of Ganjam and Koraput. Advantage was also taken of the opportunity to carry out health publicity work at all large festivals.

In the rural areas of the Central Provinces health propaganda by means of illustrated lectures was carried out in schools and villages by the epidemic staff.

In Bombay Presidency health publicity work, mainly in relation to maternity and child welfare, was as before continued by sanitary associations. The activities of the Health and Baby Week Association are described in Section XI of this report.

In Sind, in addition to the Public Health Department, Karachi Health Association and the Provincial Red Cross Society were actively engaged in health publicity work. Their activities included health exhibitions and lectures.

Nearly 600,000 health leaflets and pamphlets and over 19,000 posters were sold by the Madras Public Health Department. A new set of magic lantern slides dealing with venereal diseases was issued and ten old cinema films were replaced by new ones. A copy of the film " Never say die ", which deals with the leprosy problem, was also sold. Nearly 200,000 lectures, 1,015 cinema shows, 889 health dramas, 1,559 health exhibitions and 99 wireless talks were given to audiences totalling about a million persons. Some district

boards maintained their own touring propaganda vans which were equipped with portable cinemas, magic lanterns and health exhibits of different kinds.

Public health propaganda, with the aid of magic lanterns, was carried out by the assistant surgeons of the Public Health Department of Assam. The subjects dealt with included the more prevalent diseases such as malaria, kala-azar, tuberculosis, smallpox and leprosy. The subjects of general sanitation and food were also given attention.

In Burma, a Hygiene Publicity Bureau was maintained in the office of the Director of Public Health. Heavy demands were made by local bodies, public institutions and voluntary organisations for literature on health subjects, for the Red Cross Society's health exhibits and for the services of the Hygiene Publicity Officer. The Bureau issued a large number of leaflets and posters and the Hygiene Publicity Officer gave 104 lectures and 86 cinema demonstrations. Lantern slides were prepared on (1) food and health and (2) typhoid fever. A successful health week was conducted in Rangoon.

In the preceding paragraphs reference has been made on a number of occasions to the active part played by certain provincial branches of the Red Cross Society in connection with health education of the people. A more detailed account of the activities of this Society will be found in Section XI of this report, which also includes a description of the activities of a number of other organisations engaged in health propaganda.

Adulteration of Food.

52. Legislative and administrative action for the control of the production and sale of articles of food has two purposes in view, *viz.*, safeguarding the health of the people and prevention of " the act of debasing a commercial commodity, with the object of passing it off as genuine, for illegitimate profit, or the substitution of an inferior article for a superior one, to the detriment of the purchaser ". Because of the development of a healthy public opinion and consequent rigid enforcement of the law, gross adulteration or deliberate substitution of one article of food for another has been reduced to a minimum in countries like England. A recent authoritative English volume, in fact, states that " while in 1875 some 20 per cent. of articles sent to public analysts were found to be adulterated, the rate fell to about 5 per cent. in 1934 ". At the same time, other forms of interference with the natural qualities of articles of food have developed, and the same writers remark that " the cruder forms of adulteration have, however, given place to scientific treatment or ' sophistication ' of food by skilled chemists. Every sort of article is used to improve the appearance, colour, taste, and keeping qualities of the food which may not be without definite risk to health or may impair its nutritive value. As instances one may mention: (*a*) the fumigation of food with toxic gases to destroy insect pests, (*b*) the presence of heavy metals in foods due to the materials or containers used in manufacture and storage, (*c*) the increasing use of poisonous insecticides and fungicides in agriculture and horticulture, (*d*) the treatment of flour with bleaching and " improving " agents, (*e*) " fortification " of foods by artificially added vitamins, (*f*) the uncontrolled and unregulated exposure of food to ultra-violet rays, or (*g*) the introduction of new synthetic colours and flavours ".

In India, unfortunately, the more crude methods of adulteration, which have been largely eliminated in England, are widely practised. For instance, in Madras Presidency, of 6,724 food samples examined during 1936, as

many as 2,474 or about 36·8 per cent. were found to be adulterated. The samples were mainly of articles of food in common daily use, such as, milk, ghee, gingelly oil and butter. There is no reason to believe that adulteration is practised to any lesser extent in other provinces and it may also be assumed that attempts will be made, sooner rather than later, to adopt the newer methods of 'sophistication' of articles of food, which are now to be met with in other countries. In most parts of India, even the enforcement of existing legal provisions against adulteration leaves much to be desired. Moreover where prosecutions are successful, the fines imposed are not sufficiently heavy to have a deterrent effect, whilst few local authorities have exhibited any zeal in the vigorous enforcement of the law, even against habitual offenders. It is true that local self-government can be effective only in so far it derives support from an enlightened public opinion, whilst vested interests strenuously resist any attempt to deprive them of what they consider to be their rights, however disadvantageous to the public these may be. Routine public health administration always is, however, of educative value to the community and local authorities must be brought to realise that, in enforcing the law, they are not only helping to eliminate objectionable practices, but are contributing to the development of a public outlook inimical to the continuance of those practices. The question of adulteration of food in India is one which has more recently exercised the minds of provincial authorities and it is therefore not surprising that at the inaugural meeting of the Central Advisory Board of Health held in June, 1937, it was unanimously agreed to appoint an *ad hoc* Committee to report on the legislative measures now in force in this connection in the different provinces and to suggest such additions and amendments to these measures as might be considered necessary.

The following table gives the number of rural districts and towns in which Food Adulteration Acts were in force in the different provinces during 1936.

Urban and rural areas in the provinces in which Food Adulteration Acts were in force during 1936.

Province.	Name of the Act.	No. of rural districts.	No. of towns.
Bengal . .	Bengal Food Adulteration Act.	26	119
Burma . .	(*a*) Burma Adulteration Act.	The whole province.	..
	(*b*) Burma Food and Drugs Act.	Only in 13 Municipalities.	..
Assam . .	Assam Pure Food Act .	8	28
Central Provinces.	C. P. Prevention of Adulteration Act.	*Nil*	66 Municipalities and Cantonments.
Bombay . .	Bombay Prevention of Adulteration Act.	*Nil*	4
Madras . .	Madras Prevention of Adulteration Act.	*Nil*	61 Municipalities and 9 Panchayats.
Bihar . .	B. and O. Food Adulteration Act.	2 parts of 8 districts.	44
Orissa . .	Ditto . .	*Nil*	6

Urban and rural areas in the provinces in which Food Adulteration Acts were in force during 1936—contd.

Province.	Name of the Act.	No. of rural districts.	No. of towns.
Sind . . .	Bombay Prevention of Adulteration Act.	*Nil*	3
Punjab . .	Punjab Pure Food Act .	6	38
N.-W. F. P. .	Ditto . .	*Nil*	All municipal towns.
United Provinces.	U. P. Prevention of Adulteration Act.	6 districts and parts of 27 other districts.	136

In Bengal the Provincial Government maintained public health laboratories at Calcutta and Dacca, whilst four district authorities had their own laboratories. In addition to the usual public health work, these institutions carried out analyses of foods and the number of samples sent by local authorities for analysis increased during the year. It is worthy of note that mustard oil formed the major proportion of the samples and the Director of Public Health drew attention to the fact that milk and milk products seemed to receive little attention. The analyses carried out showed that adulteration of food was widely practised. For instance, in Dacca district 62 per cent. of the samples were found adulterated ; in Faridpur district 58 per cent. ; and in Mymensingh district 54 per cent. As regards different articles of food, the Public Health Laboratory at Calcutta found that 90 per cent. of *dahi* samples were adulterated, 56 per cent. of milk, 36 per cent. of mustard oil, and 33 per cent. of ghee. With respect to the local authorities the Director of Public Health remarked that " in so far as the administration of the Bengal Food Adulteration Act is concerned, neither the prevailing extent of adulteration nor the procedure of sampling followed by local bodies warrant any compliment to them ".

In Burma, of 89 samples of ghee taken under the Burma Ghee Adulteration Act in Rangoon eight were found to be adulterated whilst all five samples of ghee taken in Akyab showed adulteration. As the situation has been found to be so unsatisfactory it was decided to investigate the whole question of importation and sale of ghee in Burma.

Under the Burma Food and Drugs Act, 1926, standards were fixed for milk, tea, edible oils and fats, ghee, butter, coffee, and chicory, but the lack of a public analyst since September 1933, when the post was abolished, has made it impossible to enforce the Act.

In Assam, 2,000 samples were examined in 1936 against 1,900 in 1935. From 19 local authorities in rural areas, only one solitary sample was sent for analysis during the year. This was declared to be adulterated and a fine of Rs. 20 was inflicted. The law would therefore appear to be practically a dead letter so far as the rural population of this province is concerned. Among municipal boards, Shillong sent the largest number of food samples (186) of which 39 per cent. were adulterated. The D. P. H. stated that the fines imposed were unjustifiably low and that there was every reason to believe that adulteration of foodstuffs had increased enormously within recent years.

In the Central Provinces the Public Health Institute, Nagpur, carried out necessary analyses of foodstuffs. All the 13 samples of butter examined and 7 of the 10 samples of ghee were reported as adulterated. It is satisfactory

to note that standards for milk, ghee, butter, vegetable oils and other articles of food have been fixed and that a public analyst has been appointed for the local areas to which the provisions of the Act have been extended. Local bodies have also been authorised to purchase samples of food and to send them for analysis to the public analyst.

In Bombay Presidency the Prevention of Adulteration Act was in operation in the three municipalities of Ahmedabad, Surat and Broach in addition to Bombay City. Milk and ghee were alone sampled and both showed high percentages of adulteration, the rates being 60 per cent. for both articles in Ahmedabad and Broach and as high as 83 per cent. for ghee and 78 per cent. for milk in Surat.

In Madras Presidency, the most commonly sampled articles were milk, gingelly oil, ghee and butter. A new rule was introduced during the year rendering it illegal to sell adulterated ghee or butter even if the vendor declared it to be adulterated. This rule should have a wholesome effect in checking adulteration of these important articles of food. Regarding the working of the Act the D. P. H. remarked, " though the fines imposed on prosecutions under the Act have on the average shown a slight increase, they are rarely deterrent enough. As the quota of samples allowed even for bigger municipalities is only 12 per month it is unlikely that the few merchants who are prosecuted will be sampled again frequently with the result that their fraudulent practices may continue undeterred as they can easily pay trivial fines out of their large illegal profits ".

In Bihar the main articles of food sent for analyses were ghee, mustard oil, milk and *atta*. High percentages of adulteration were recorded, the rates being 45, 40 and 64 per cent. for ghee, mustard oil and milk respectively. All samples of *atta* were found to be free from foreign starches.

In Orissa, no separate public health laboratory was maintained and all articles requiring chemical or bacteriological examination were sent to the public health laboratory at Patna or to the King Institute, Guindy. As in other provinces, the proportion of adulterated articles was very high, that for milk being as much as 82 per cent.

The Punjab Pure Food Act has been adopted by 44 local bodies in the province. Of these five municipalities, Lahore, Amritsar, Rawalpindi, Beri and Sonepat have appointed their own analysts, while the Public Health Chemist is public analyst for 39 other local authorities. Municipalities having their own public analysts examined 3,897 samples during the year, of which about 32 per cent. were found adulterated. On the other hand, for all the other 39 local bodies the number of samples examined was only 209, the number for individual local authorities ranging from 6 to 43. The Director of Public Health remarked that, for the province as a whole, no material progress was made in the effective working of the Act.

In the North-West Frontier Province 101 samples of ghee were examined of which 26 per cent. showed adulteration; of 32 samples of milk 27 per cent. were adulterated.

In the United Provinces the number of samples examined has steadily increased during the past few years, the figure of 9,378 for 1936 being nearly double that for 1932. The extent of adulteration varied, in the case of 15 selected municipalities for which figures are given in the D. P. H's. report, from 11 per cent. in Cawnpore to 37 per cent. in Benares. The rate for the province as a whole was 20 per cent. The provisions of the Butter, Ghee and Fat Licensing Rules of 1930 were reported to be effective in checking adulteration of ghee. These rules were enforced in 39 localities.

Housing.

53. It is not ordinarily possible to estimate the effects of bad housing by any objective measure of health, such as comparative morbidity and mortality statistics, because of the difficulty of assessing the parts played by other social factors such as poverty and ignorance which are commonly associated with the question under consideration. At the same time, the fact is that unsatisfactory and insanitary human dwellings do exert an adverse effect on the health of the individual and of the community. For instance, the high morbidity and mortality caused by communicable diseases are without doubt partly attributable to bad housing conditions, because overcrowding and bad sanitation not only aid in the dissemination of infection but tend to lower the vitality of the individual. This has been generally recognised by health authorities and administrators all over the world and for this reason the whole question of housing is one which is at present the subject of serious study by all civilised countries and by the international health organisations maintained by those countries. At this point, it may be well to state that the term 'housing' is used here not in the restricted sense of the actual dwelling, but as including, in addition, such factors as the surroundings, the soil and the atmospheric conditions of the locality.

In India, this branch of public health work has at no time received the attention it deserves. Even at the present day, few local board or municipal authorities devote any time or money to the question and, although the report of the Royal Commission on Labour six years ago included some severely critical remarks in respect of the apathy displayed by most of those on whom responsibility lay and on the danger to health caused by existing conditions in many of the larger towns, this section of the Report remains one on which no substantial progress can yet be notified. The Royal Commission, of course, dealt only with the problem of the housing of industrial labour; there is, however, the larger problem of improving the homes of the vast rural population of this country, a task which will tax the energies of provincial Governments and local boards for many years to come, even if they begin the work now. The improvement of housing brings authorities up at once against various difficulties, including finance, administration, ownership of land, undesirable habits of the people and numerous other social and economic factors which may all interfere with progress. The problems associated with housing of the working classes, as the Labour Commission's report pointed out, are not susceptible of any easy or quick solution, but they demand, as so many public health questions do, a long range view and the gradual execution of programmes designed to secure steady and progressive advance.

In the following paragraphs, an attempt has been made to summarise the information supplied by Directors of Public Health regarding the housing situation in individual provinces and States. Provincial Governments have also accepted the suggestion that this subject should in future be included in their annual public health reports and it is hoped that the repeated comments which will be made in future by provincial Directors of Public Health and in the Public Health Commissioner's reviews will serve to draw pointed attention to the present unsatisfactory state of affairs and to stimulate public demand for a more active policy than has so far existed.

Bombay.

Urban Housing.—Economic conditions in this country do not admit of the application of European standards, whilst social conditions often make it difficult to carry out improvements in towns which may demand the removal of a number of persons from their

ancestral homes or from localities with which their families may have been associated for generations. The regulation of buildings and the reclamation of unhealthy localities constitute a responsibility which has long rested on municipal boards under existing Municipal Acts and, although, generally speaking, no very active policy has been adopted, a number of municipalities have framed bye-laws governing the erection of new buildings and providing among other things for proper light and ventilation. Similarly in 1915 the Bombay Town Planning Act, which incorporated the principal provisions of the Town Planning Acts of England and Germany, was passed with the object of ensuring that areas converted into building land should be developed in such a way as to secure proper sanitary conditions, amenities and conveniences and assistance to municipal funds by enforcing contributions towards the cost of construction of roads and other works after development had taken place. The Act, which has so far been applied to 19 towns, gives extensive powers for the regulation of buildings in town planning schemes, so that the congestion and squalor so much in evidence in existing towns may be avoided in newly developed areas. In addition, a number of housing societies and reconstruction societies have been established in certain towns in this Presidency and these have contributed to an improvement of urban housing to some extent. The question of modernising housing legislation is also at present under the consideration of Government. The Bombay City Improvement Trust which had been in existence for a number of years was recently dissolved and its functions taken over by the Bombay Corporation.

Rural Housing.—As regards rural housing, little or no provision exists in the Local Boards Act. The public health problems created by bad housing conditions and insanitary surroundings in town areas are equally to be met with in the villages, although perhaps owing to the more open surroundings they may seem to be of a less pressing nature. It is true that a few old villages are to be found in this province where the houses have been laid out and built on hygienic lines in accordance with indigenous practice and with the maxims of the Hindu Shastras. But in most villages the housing, the planning, the drainage and the sanitation are all primitive. Many houses are constructed on low mud or rubble plinths or without any plinth at all; few have sufficient window space, with the consequence that the rooms are dark and badly ventilated. These conditions are all favourable to the accumulation of dirt and the development of disease. A short pamphlet on the principles of housing, planning, etc., as applied to villages has been prepared by the consulting surveyor to Government and village improvement committees which have been formed in every district have used this pamphlet in advising the villagers as to the methods to be adopted for improving the conditions of their houses. Progress, however, is very slow.

In pursuance of a recommendation made by the Royal Commission on Labour in India, the Government of Bombay have advised local bodies to use type designs for working class houses and for latrines, prepared in consultation with the Public Health and Public Works Departments. The minimum requirements suggested for one family tenement are a living room, a kitchen, a smaller room for store, a verandah on the southern side and a bath room.

Building Societies and other similar organisations.—(*a*) *Urban Areas.*—At the present time, some 85 housing societies have been founded, but, as might be expected, their activities are confined to the large industrial cities like Bombay and Ahmedabad and they cater only to the needs of the middle and upper middle classes, including a large element of Government servants and salary earners. These societies conform to one or other of three types :—(1) co-partnership tenancy, (2) tenant-ownership, and (3) mixed [a combination of (1) and (2)]. In Ahmedabad, a Harijan (depressed class) colony has been created and a large number of Harijan families are housed by the Vanker and the New Co-operative Housing Societies. More recently, another housing society has been registered for the Harijans in Poona. The organisation and planning of schemes for housing of the lower middle classes, consisting of wage-earning artisans and mill-hands, presents considerable difficulties and attempts made in this direction in the past have had little success. A case in point is the St. Joseph Guild Co-operative Housing Society at Ahmednagar which, after a precarious existence, had to be wound up.

The communal tie has been a common characteristic in regard to membership of these housing societies. Out of 80 societies in existence on 30th June, 1936, about 60 are working on a communal basis. This basis of organisation has been found to be very suitable, as the housing society apart from providing housing accommodation is also intended to provide social amenities and these can best be achieved where there is a bond of common habits and common usage among the members.

The working capital of the societies is derived largely from loans, but also in part from members' contributions towards share capital. In the initial stages of the movement, Government made loans to the societies at interest varying from 4½% to 6¼%, these rates comparing very favourably with those which the society would otherwise have had to pay. The Government were also able further to reduce their interest rates from time to time, consistent with reduction in the rates on their own borrowings. In 1933, however, Government decided to incur no fresh commitments in this respect, so that the building societies have now to make their own arrangements for finance and in certain cases insurance companies have advanced loans. The total amount advanced by Government to housing societies aggregated about Rs. 36 lakhs and the priod of repayment varied from 25 to 40 years, although in one or two cases it extended to 50 years. Apart from State aid by way of long-term loans, Government have also assisted the housing societies in the matter of acquisition of building sites. On the whole, progress has been satisfactory, as may be seen from the following figures :—

	1934-35.	1935-36.
	Rs.	Rs.
Number of societies	77	80
Number of members	5,654	5,617
Share capital	20,07,683	20,70,477
Reserve fund	1,74,534	1,79,740
Working capital	90,70,335	90,73,070

(*b*) *Rural areas.*—As yet few signs are to be seen of any enthusiasm for removal of the squalid conditions ordinarily associated with rural houses. Housing societies of a special type had to be organised in Gujarat in 1928 to meet the situation created by the unprecedented floods which had destroyed large numbers of houses and in some cases had washed away whole villages. In order to give relief through co-operative agency, the Co-operative Societies Department, under a special set of bye-laws, organised reconstruction societies in the flood stricken areas. As a result of the initiative taken by Government, 25 house reconstruction societies came into being and these were granted loans amounting to over a lakh of rupees.

Industrial Housing Schemes.—Associated with the Government of India stamps and notes factories at Nasik Road, a new town has arisen with a population of nearly 3,000 persons. Houses for the Indian staff are of four different grades. Both streets and houses are provided with electric light whilst a chlorinated water supply and a water-borne sewerage system are additional modern amenities. On the welfare side, a medical officer supervises the health of the colony and a club house and sports ground have been provided. This scheme is the best of its kind in the Presidency and illustrates how most of the usual public health defects of modern industrialisation may be avoided.

The employees of the Government Central Distillery at Nasik Road are also well housed and enjoy several of the amenities mentioned above.

In Bombay city, the outstanding development is the industrial housing schemes inaugurated by Government a number of years ago, no less than 207 chawls comprising 16,524 rooms being constructed on open sites well outside the overcrowded areas of the city. The municipality has provided 103 good quarters for its employees at the Love Grove pumping station and has also sanctioned, as part of the slum improvement scheme, the construction of 150 semi-permanent rooms at a cost of Rs. 75,000. These rooms will shortly be built and are intended to house families at present living in insanitary dwellings belonging to the municipality or to private parties who have built on municipal lands. About 120 factory hands and tannery workers will directly benefit. In addition, the municipality have recently constructed 550 semi-permanent rooms and propose to construct a further 150 to replace a large number of old corrugated iron sheds. The cost of this scheme will be nearly three lakhs, but its execution will materially improve working class housing in the north of the island where improvement was urgently required.

In Amalner, nearly 2,000 employees have been provided with accommodation in chawls built near the Pratap Mills. Satisfactory quarters for the employees of the New Pratap Mills in Dhulia were built in 1927 in consultation with the Public Health Department. Two types of chawl were provided; in one, the quarter has three and in the other two rooms. In contradistinction, the temporary sheds built at a later date are far from satisfactory.

In Ahmedabad, the Labour Union has constructed 100 tenements for mill hands on a tenant-ownership basis, the tenants becoming full owners at the end of 22 years. Twenty tenements were built in 1935 at a cost of Rs. 23,000, each consisting of two rooms, a kitchen, a verandah and a yard. This standard is higher than that of houses usually occupied by textile workers. In 1933 and 1934, the Ahmedabad Mills Housing Society built 435 tenements and 304 of these are occupied. The Calico Mill, Ahmedabad, has constructed 28 tenements and an additional number are in course of construction. The Company has also devised a housing scheme which should appeal to the higher paid worker and the lower subordinate. Each tenement consists of two rooms and a kitchen and adequate sanitary and washing facilities have been provided whilst electric lighting may be obtained if desired. The rents range from Rs. 8 to Rs. 18.

The temporary housing in a few sugar factories is being replaced by housing of a permanent type.

Statistics collected a few years ago showed that about 17 per cent. of all factory hands were provided with quarters or rooms. The following tables include data, compiled by the Labour Office, relating to the housing of factory labour by the principal industries in the various centres of Bombay Presidency :—

TABLE No. 1.

Extent of housing provided by Engineering employers for their factory workers.

(Position as in May 1934.)

Rents.	No. of tenements.	Remarks.
Free	585	Mainly for watchmen.
Below Re. 1	148	
Re. 1 and below Rs. 2	715	
Rs. 2 and below Rs. 3	291	
Rs. 3 and below Rs. 4	43	
Rs. 4 and below Rs. 5	303	
Rs. 5 and below Rs. 6	50	
Rs. 6 and below Rs. 7	1	
Rs. 7 and below Rs. 8	217	
Rs. 8 and below Rs. 9	91	
Rs. 9 and below Rs. 10	5	
Rs. 10 and over	19	
Unspecified or 10% of pay	216	
Total	2,684	

TABLE No. 2.

Extent of housing provided by Cotton Mill employers in Bombay City.

Rents.	Number of one room tenements.	Number of two or more roomed tenements.
Re. 1 and below Rs. 2	11	..
Rs. 2 and below Rs. 3	224	..
Rs. 3 and below Rs. 4	367	..
Rs. 4 and below Rs. 5	607	..
Rs. 5 and below Rs. 6	1,307	504
Rs. 6 and below Rs. 7	260	..
Rs. 7 and over	14	295
Unclassified and rent free	273	25
Total	3,063	824
	3,887	

TABLE No. 3.

Extent of Housing provided by Cotton Mill employers in Ahmedabad City.

Rents.	Number of one room tenements.	Number of two or more roomed tenements.
Re. 1 and below Rs. 2	196	..
Rs. 2 and below Rs. 3	388	..
Rs. 3 and below Rs. 4	426	..
Rs. 4 and below Rs. 5	1,062	152
Rs. 5 and below Rs. 6	178	185
Rs. 6 and below Rs. 7	3	1
Rs. 7 and over	24	..
Unclassified and rent free	476	350
Total	2,753	688
	3,441	

TABLE No. 4.

Extent of Housing provided by Cotton Mill employers in Sholapur City.

Rents.	Number of one room tenements.	Number of two or more roomed tenements.
Rent free	122	..
Re. 1 and below Rs. 2	571	..
Rs. 2 and below Rs. 3	236	354
Rs. 3 and below Rs. 4	270	..
Rs. 4 and below Rs. 5	80	..
Rs. 7 and over	10	..
Total	1,289	354
	1,643	

TABLE No. 5.

Extent of Housing provided by employers in Cotton Mills outside Bombay, Ahmedabad and Shotapur.

Rents.	Number of one room tenements.
Below Re. 1	1,398*
Re. 1 and below Rs. 2	663
Rs. 2 and below Rs. 3	554
Rs. 3 and below Rs. 4	313
Rs. 4 and below Rs. 5	140
Rs. 5 and below Rs. 6	..
Rs. 6 and below Rs. 7	139
Rs. 7 and over	..
Unclassified and rent free	1,020
Total	4,227

*1,081 of these tenements were provided by the Gokak Mills at Gokak. The rents were as follows:—4 annas per month—31 tenements; 6 annas—11; 8 annas—364; 10 annas—69; 12 annas—519; 14 annas—87. The total number of tenements provided by this mill was 1,229. The rents of 148 tenements ranged from Re. 1 to Rs. 2-8-0 per month.

Punjab.

Urban Housing.—In municipal towns and in the territories of Notified Area Committees, under Section 189 of the Municipal Act, no person can erect or re-erect or commence to erect or re-erect any building without the sanction of the municipal committee. Most of the municipal committees have framed bye-laws. Model bye-laws have also been framed by Government for the guidance of local bodies.

Under Section 192, building schemes for built-up areas and town-planning schemes for unbuilt-up areas may also be prepared by local bodies. Such schemes are, from time to time, drawn up by municipal committees and sent to the Commissioner and to the Government for sanction. Such schemes may provide for the following matters :—

(*a*) Restriction of the erection or re-erection of building or any class of buildings in the whole or any part of the municipality and of the use to which they may be put ;

(*b*) The prescription of a building line on either side or both sides of any street existing or proposed ;

(*c*) The amount of land in such unbuilt-areas which shall be transferred to the Committee for public purposes including use as public streets by owners of land either on payment of compensation or otherwise, provided that the total amount so transferred shall not exceed 20 per cent and the amount transferred without payment shall not exceed 10 per cent of any one owner's land within such unbuilt area.

An Improvement Trust has been instituted at Lahore and another is contemplated for Simla. The former is engaged in preparing lay-out schemes for unbuilt areas and in laying down conditions for the control of building operations in certain parts of the Civil Station of Lahore where open land has not yet been built over.

For small towns, under Section 35, clause (*m*) of the Punjab Small Towns Act, general orders may be framed for the regulation of the erection or re-erection of buildings including the prevention of the erection or re-erection of any building for any reason the committee may deem to be just and sufficient or in pursuance of a general scheme sanctioned by the Commissioner, restricting the erection or re-erection of buildings or any class of buildings. A model "General Order" under this provision has been framed by the Government. General orders have been framed by most of the Small Town Committees under this Section.

No housing scheme for residential purposes has been undertaken by local bodies themselves. Lay-out plans have been prepared and private persons have constructed their own buildings.

Rural Housing.—For rural areas, the District Board Act contains no restrictions for building construction nor for the drawing up of any lay-out schemes. In the Nili Bar Colony a large number of small villages have, however, been laid out according to definite plans prescribed by the Government for new habitations. Model plans for these villages were prepared by the Public Health Department. In addition, general principles in respect of the public health requirements for these villages have been drawn up by the Director of Public Health.

Recently 13 graduates have been allotted land in Lower Bari Doab Canal Colony in Montgomery district. A lay-out plan for this *abadi* has also been prepared by the Government on sanitary lines. A clause in the statement of conditions for the grant of this land requires that each grantee shall build a residential house which shall either be according to a standard plan approved by the Government or in accordance with modifications to that plan approved by the Collector.

The ventilation and lighting of village houses, installation of fireplaces and chimneys and the provision of proper storage arrangements for grains and food-stuffs receive special attention at the hands of the public health staff. In regard to ventilation, the Rural Reconstruction Commissioner has stated that since 1932, when he started the ventilation campaign in the Multan Division, ventilators were being put into the houses or ventilation openings were being made in the walls at the rate of about a thousand a day and that practically no new house was ever now built without fairly good ventilation.

Building Societies and other similar organisations.—A Co-operative Model Town Society, Limited, which works on a co-operative basis, has laid out on area, purchased from Government, for residential purposes. This land may be said to be located in a rural area, but in actual fact lies in a suburb of Lahore and for the most part the Society is concerned with an urban population.

Industrial Housing Schemes.—According to the recommendations of the Royal Commission on Labour, model plans are under preparation for houses of workmen employed on industrial works. No working class houses have been constructed by the speculative builder. A few employers provide dwellings for a limited number of their employees, including labourers, but their number is negligible.

United Provinces.

Although certain differences are to be seen as regards the style of houses in various areas, there is, nevertheless, some uniformity as regards their design and inner arrangements. The question presents itself in three aspects :—(*i*) Housing in large towns and cities, (*ii*) Housing in smaller towns and (*iii*) Housing in villages.

Urban Housing.—Large towns and cities.—Whilst there may be considerable numbers of large and hygienic houses in different parts of the average large town, in the older cities particularly most of the houses are far from satisfactory and the irregular lay-out makes narrow and dark lanes a common feature. The old houses, although large, are in most cases unprovided with proper means of ventilation, lighting and drainage. Scavenging and conservancy are also mainly of unsatisfactory types. Improvements in the general design of houses and in sanitation are, however, gradually being effected and most of the newer houses are now built with due regard to ventilation, light and sanitation. In towns equipped with underground drainage system and water supply, many of the better class Indian houses are connected with sewers and water supply.

Improvement Trusts exist in Lucknow, Allahabad and Cawnpore and these organisations have effected great improvements. The most congested and insanitary portions of these cities have been acquired and all houses unfit for habitation have been demolished. Good wide roads were laid out and plots lying along the roads were sold for building purposes. Type designs of various grades of house, with due regard to Indian habits and mode of living, were prepared and it is a condition for the purchase of the plots that the houses to be constructed should be in accord with these designs. To relieve congestion, town extensions were also planned and open spaces round the town were laid out in a similar manner.

Housing in small towns.—Houses in small towns are usually of a better design than those in rural villages. Here and there are to be seen *pucca* houses built with due regard to height of roof, plinth, ventilation, etc., but the frequent existence of cattle sheds and stables and the absence of proper drainage and conservancy arrangements in residential buildings make these towns as insanitary as the ordinary village. Unlike the average village, latrines are often attached to the houses and scavanging is done by sweepers. Cleansing of utensils, bathing, washing of clothes, etc. is generally done in the houses and one often finds a well inside the house, especially in the western part of the province and in localities where the sub-soil water level is high.

Occasionally underground cellars are to be found in some of the old houses. These are used for storing grain and in the hotter parts, such as Muttra, Agra and Jhansi, they are often used as places of refuge during the day-time in summer.

In the eastern part of the province the majority of the middle class houses of an older type have roofs covered with country made tiles and these are very unsatisfactory. This type of roof, however, is being given up gradually and recently built houses are planned with due regard to light, ventilation and drainage.

Rural Housing.—Little difference is noticeable between village houses in different parts of the province and the design is almost stereotyped. The houses are small, usually single storeyed and enclosed with mud walls. Roofs in the eastern districts are invariably lower than in the western districts and consist of country-made tiles of a crude type whilst in the west the houses are either thatched or have flat mud roofs supported on wooden scantlings. The absence of the purdah system in rural areas dispenses with the necessity of providing courtyard which is an essential feature of houses in urban areas.

In many instances, an open space is surrounded by a group of houses occupied by different families living together known as "Bagar". The families are usually related to one another and the open space is used jointly for the purpose of tethering cattle during the night, for an open air sleeping place during the hot weather and for other domestic purposes.

The villagers appreciate cleanliness and try to keep their houses as tidy as they can and floors and walls are plastered frequently with cow-dung and clay. The chief drawback is that the houses are ill-ventilated and dark and the absence of chimneys prevents smoke from escaping. The fact that they have no house latrines and that utensils, etc., are cleansed near the village pond or well may be considered an advantage from the

point of view of sanitation of the houses, but is counteracted to a great extent by the practice of keeping cattle inside the courtyard. The kitchen forms a necessary part of the house as cooking is done by the womenfolk and people are orthodox about the *Chauka* system. The main idea underlying the *Chauka* system is cleanliness and it is observed by all high caste and orthodox Hindus. A room or a corner in the house is reserved for cooking purposes and is cleaned and washed after each meal is prepared.

Village sites are usually selected on high ground to avoid danger from flooding, but selection of a site is also influenced by the presence of a suitable water-supply. Village houses are usually built close together for protective purposes. They are also generally set down in an irregular manner, so that roads and lanes are narrow and winding without drains or conservancy arrangements. House latrines are ordinarily conspicuous by their absence.

In numbers of villages, " panchayats " have within recent years been organised by Government. Villages having a population of two thousand or over are governed by the Sanitation Act, and the Panchayat is made responsible for looking after the general sanitation of the village and the welfare of the people. Rural sanitation is looked after by the District Board and the grants made by the Government for the purpose are placed at the disposal of the District Boards to be spent in the best possible way.

Plans of a model village and type designs of houses suitable for Zamindars and cultivators of various grades have been prepared by the Public Health Department. In preparing these plans, due consideration has been paid to the variations required by different habits and different modes of living. A type design of latrine with soakage pit suitable for the use of Zamindars has also been prepared ; for this the services of a sweeper are not required.

Bihar.

Urban Housing.—Improvement Trusts exist in Monghyr and Darbhanga towns, but that previously working in Patna is now defunct.

The Tata Iron and Steel Company at Jamshedpur have constructed 6,285 houses of various types up to the 31st July 1937, *viz.*, 3,026 inferior type quarters with a rent up to Rs. 5 per mensem ; 2,680 medium type quarters with a rent up to Rs. 15 per mensem ; 291 superior type quarters with a rent up to Rs. 30 per mensem ; and 288 bungalows with a rent over Rs. 30 per mensem.

The Company has also granted leases for the construction of residential premises to 73 employees and 104 non-employees. Nearly 600 separate units have been constructed on these leased plots. The Company encourages the building of houses by its employees and for that purpose loans are granted at three per cent interest. The total amount of building loans granted up to the 31st March, 1937, was Rs. 4,40,653. In addition to the quarters provided by the company, employees have built 4,820 *kutcha* quarters for themselves. Non-employees have erected 3,400 *kutcha* quarters outside Jamshedpur.

The quarters provided for mine employees by the Bengal Nagpur Railway are of the same type as that generally provided on the Railway for its menial staff. These types are gradually being improved as far as financial conditions permit.

The Jamalpur railway colony on the East Indian Railway consists of two parts *viz.*, East Colony and West Colony. 272 units of multiple room quarters in the East Colony have been either entirely constructed new or renovated since the earthquake of January, 1934. In the West Colony there were 246 units, 75 per cent of which were of the single room type before the earthquake of 1934. Since then all these quarters have been renovated and, in addition, a well laid out new colony called the Rampur Colony has been constructed which contains 511 units of quarters with space for expansion. Both colonies are equipped with a water carriage system for sewage disposal with septic tanks and aerating apparatus. Electric lighting has been provided for all houses. A dual water supply system has been installed, unfiltered for sewage and gardening and filtered for drinking.

Central Provinces.

Urban Housing.—In most towns, both large and small, the older sections are generally on the lines typical of Indian cities,—closely packed, badly lit and ventilated, rambling houses with narrow tortuous streets and lanes devoid of proper drainage and equipped with the most primitive type of sanitation. Such blocks exist in the central parts of the towns round about business places. As one passes outwards, zones of less *pucca* houses

appear until at the periphery are to be found houses, huts and hovels made of mud, presenting conditions similar to those found in rural areas. Although exhibiting every sign of poverty, they are much cleaner in their surroundings than the more pretentious residences. In most cases, the interiors are remarkably clean and tidy and, because of the primitive habits of the people, their surroundings are not rendered unhygienic by the existence of private privies and an abundance of domestic solid and liquid wastes.

Here and there, throughout the towns, exist nests of huts and hovels occupied by the poorer sections of the population, such as "*mangs*", "*wadars*", "*mahars*", etc., and also by labourers employed in mills, ginning factories, oil presses, rice mills and other industries. These usually are very insanitary and entirely unfit for human habitation.

In what may be called the suburban areas, the better classes have recently started to build bungalows and cottages surrounded by fields and orchards and in many towns "extension areas" have been acquired for development.

Most local committees have building bye-laws framed on the lines of the Model Bye-laws drawn up by the Provincial Government.

An Improvement Trust for the town of Nagpur has been sanctioned by Government and has commenced operations.

There are no building societies or other voluntary organisations engaged in providing houses in urban or rural areas.

A model colony of 245 houses designed to accommodate about 1,500 persons is to be seen at Indora, Nagpur, for workers of the Empress Mills. This colony is an example of sound sanitary development.

Facilities for housing accommodation are provided by a proportion of factory owners. The quarters provided by the larger concerns are maintained in good condition. For example, some of the mill workers of the Empress Mills, Nagpur, reside in a model town equipped with modern sanitary conveniences on the water-carriage system. Excellent quarters for the manganese miners have been provided at the Bharveli, Tumsar and Ramtek mines and further housing is under construction at Bharveli. The permanent quarters for miners at Balarshah mines are, on the other hand, unfit for human habitation.

Rural Housing.—No rules or regulations exist for the control of building operations in rural areas. The nature and structure of houses depend on individual requirements and choice. In the majority of villages the few *pucca* houses are owned by *Malguzars, Patels* and other well-to-do persons, whilst the ordinary villagers live in mud houses and the very poor in huts of grass and twigs. In spite of the primitive nature of many of these houses, they cannot be condemned as unhealthy as the majority are provided with open yards and open spaces at the back. In the lay-out of villages, however, no plan or design is followed. The streets and lanes are usually narrow and in most cases *kutcha*. Any system of village drainage is consequently almost impossible. The chief defect in the living rooms of village houses is the absence of arrangements for lighting and ventilation. Windows are disliked because of the desire for privacy and safety and the rooms are dark even during the day.

Revised building model bye-laws have been framed and a circular has been issued on housing in relation to tuberculosis.

Bengal.

Housing conditions in this province are far from satisfactory. The great majority of the municipalities have not adopted suitable bye-laws even for buildings, far less for town planning, and practically nothing has been done with regard to village planning and village housing. Villages have grown up in haphazard fashion and no supervision or control is exercised with regard to the construction of homesteads. A Village Planning Act is necessary for regulating the development of new villages, the replanning of existing villages and the construction of individual homesteads. A great deal of education will be necessary before much progress can be made and models of well-planned villages and houses should be utilised for this purpose.

Urban Housing.—Something over three million people live in the urban areas of Bengal the houses having widely different designs and being constructed of materials varying from bricks to mud and bamboo and thatch. Except in Calcutta city, no systematic planning has been practised and even in Calcutta itself are to be found large numbers

of crowded and insanitary *bustees*. As a matter of fact, out of 118 district municipalities, only 17 have framed and promulgated housing bye-laws. The following statement shows how unsatisfactory the position is :—

Number of municipalities from which no reply has been received as yet.	Number of municipalities from which replies have been received but which are not willing to frame building byelaws.	Number of municipalities which have not framed any byelaws but are willing to do so.	Number of municipalities which are framing the byelaws.	Number of municipalities which have framed bye-laws and have applied to Government for this sanction.	Number of municipalities which have framed bye-laws and have promulgated them.
34	20	19	12	16	17

The absence of bye-laws and their application explains to a great extent the congestion which is now to be met with in many urban areas, especially those which are becoming industrialised and the same defect permits the haphazard construction of houses unprovided with adequate ventilation, damp-proof courses, outlets for smoke or arrangements for conservancy and drainage. These defects undoubtedly react unfavourably upon the health of the inhabitants and conditions are aggravated by the over-crowding in individual homes, partly due to a low standard of living and partly due to lack of suitable accommodation. Frequently two or three families live in a house really fit for a single family only and two or three generations may occupy the same room.

Rural Housing.—In the rural areas, where over 47 millions of people live, a haphazard growth of houses and homesteads has resulted in overcrowding, insanitation and the formation of innumerable breeding places for mosquitoes. In consequence, diseases like tuberculosis and malaria have caused considerable deterioration in the general health of the people. Certain powers have been given to Union Boards under which they can deal with insanitary houses under the Village Self-Government Act, but little or no action has so far been taken. The replies received to an enquiry made from district boards, as to housing conditions in the rural areas, showed that no Improvement Trust or Building Society was in existence nor was there any Industrial Housing Scheme in force. The only evidence of any activity in this field was the reported existence of an Advisory Station Committee in Kalimpong.

In order to improve the present state of affairs both in urban and rural areas, it is suggested that all municipal committees should adopt suitable bye-laws and that a Small Town Planning Act and a Village Planning Act should be passed by the legislature.

Orissa.

Urban Housing.—As regards urban areas, housing improvements are being gradually but steadily effected through the powers given under the Bihar and Orissa Municipal Act and the Madras District Municipalities Act. New buildings and alterations to old buildings cannot be carried out unless the plans are approved by the municipality and, where there is a qualified health officer, new houses are only allowed to be constructed when they come up to certain simple standards of sanitation and ventilation as well as structural safety. In certain municipalities, a special staff is employed to detect and take steps for the removal of encroachments on public roads and open spaces which not only interfere with traffic but also tend to increase over-crowding. Anything more ambitious on the lines of town-planning demands greater expenditure than the ordinary municipalitiy can afford.

In Berhampur municipality, Ganjam district, however, a town planning committee has been constituted. The committee is responsible for the selection of plots suitable for the development of housing schemes and for the lay-out of these plots. A co-operative bank in the same town grants loans to those who intend to build houses and a house building society similarly advances loans to the extent of 50% of the total cost of construction. A further scheme approved by the municipal council is the selection of two areas which have been set apart for industrial housing and for factories. These plots are far away from residential areas.

In Orissa there are no large industries which have necessitated large bodies of labourers living on the spot and the question of industrial housing has so far hardly risen. Labourers working in small factories situated in urban areas live in these towns or their suburbs.

Rural Housing.—In rural areas the houses are crowded together in small *bustee* sites without any plan and with no means of sanitation. The average house consists of a thatched roof on a wooden frame work with walls of mud, the plinth varying in height according as the site is liable to floo ding or not and the floor space averaging about 25 × 10 feet.

Ventilation in most cases is totally inadequate. Well-to-do people are beginning to construct more roomy and better ventilated houses, but existing efforts for the improvement of *bustee* conditions, through welfare committees and similar organisations, have so far all been directed to the betterment of environmental sanitation and the cleaning of village roads. In the primary schools, miniature model houses are used for instructional purposes.

The Provincial Government has now formulated a village welfare scheme which will be concerned with the improvement of village houses. To start with, one village in Cuttack district has been selected for the purpose and houses on improved sanitary lines have been constructed there to serve as models and are occupied by the officers engaged locally for village welfare work. The Welfare Officer carries out propaganda and instructs people in the methods to be adopted for constructing houses on sanitary lines.

Sind.

Urban Housing.—There are no Improvement Trusts or other bodies concerned with the improvement of houses in any of the towns in this province. A number of co-operative housing societies have been formed in Karachi city and to these the Karachi Municipal Corporation have given land at concession rates. Such societies have built houses for their members on a tenant-owner basis. The Karachi Municipal Corporation follows the consistent policy of opening up congested areas and of improving narrow streets and roads and has promulgated a set of Building Rules providing for the construction of houses on sanitary principles. Co-operative housing societies also exist in the towns of Hyderabad, Shikarpur and Dadu. A Muslim Co-operative housing society is proposed to be started in Nawabshah. No industrial housing schemes are to be found in the urban areas of this province. The Karachi Port Trust, the North-Western Railway and the Karachi Municipal Corporation have provided a number of quarters for their low paid staffs. The Corporation have also sanctioned a five-year plan for the construction of additional quarters for their subordinate employees.

Rural Housing.—So far no schemes have been prepared for the improvement of rural housing, but Government have sanctioned Rs. 15,000 during the current financial year for a scheme for the establishment of model villages in Sind. The proposal is to appoint a special officer for this purpose and the Government have this matter under consideration. In Dadu district a co-operative housing society for the employees of the District Local Board and Muslim and Hindu Co-operating housing societies have been registered, but these are not as yet functioning.

Madras.

In this province, the Madras Town Planning Act and the Madras District Municipalities Act contain legal provisions for the control of housing. Government have framed comprehensive rules for the control of building sites, for the construction of buildings and for house drains, cess-pools, septic tanks, latrines, wells, etc., in virtue of the powers conferred on them by Section 191 of the Madras District Municipalities Act.

The provincial Government has employed a Director of Town Planning for a number of years past and the following information is taken from that officer's administrative report for 1936-37 :—

Municipal Housing.—Lay-outs with designs for quarters were furnished during the year to three municipalities. These were meant for scavenger's colonies and settlements for depressed classes.

Revenue Department schemes.—Plans for 95 poor class colonies were furnished to Collectors and other revenue authorities during the year.

Labour Department schemes.—Plans for 19 labour class colonies were supplied to District Labour Officers or the Commissioner of Labour.

Another scheme referred to the Director of Town Planning dealt with the formation of a poor class colony in Madras City ; several other similar schemes were referred to him by local bodies.

Utilisation of government land in local areas for private housing.—Government have laid down the policy that the prior approval of the Director of Town Planning should be obtained for every lay-out of Government land within municipal areas for private housing purposes. In addition to 83 municipalities, Government extended this rule to a number of towns during the year.

Co-operative Building Societies.—With a view to relieving congestion in urban areas since 1923 Government have advanced loans amounting to Rs. 50 lakhs to co-operative building societies for the construction of new dwelling houses. These loans are repayable in 20 years, the present rate of interest being 4½%. Members of societies have to contribute one quarter of the loan required as share capital.

At the end of the co-operative year 1935-36, there were 118 building societies with a membership of 4,040. A total of 1,809 houses, valued at Rs. 58·17 lakhs, have been completed and 129 houses valued at Rs. 4·05 lakhs were pending construction on 30th June 1936.

Delhi.

Generally speaking, both in urban and rural areas, congestion and overcrowding exist to such an extent as to constitute a serious menace to public health.

As regards rural areas, the majority of houses are built back-to-back so that cross ventilation is impossible, but steps are being taken to encourage roof ventilation. The Central Village Welfare Board has made available concrete or wooden frames for use as windows in the walls of rural dwellings and the adoption of these aids to ventilation has been everywhere encouraged. In many rural areas, the villagers at first adopted these measures with enthusiasm, but only too frequently the windows were later on blocked up. The complaint was made, and with some reason, that in winter the draught caused by these open and shutterless windows was more than could be comfortably borne.

The average village house is a combination of cow byre, courtyard and living room where cattle and human beings live together in unhygienic confusion. Attempts so far made to induce the villagers to stable their cattle in some communal byre, separate from their habitations, cannot be said to have met with success. During the day it has been possible to persuade the villagers in certain cases to make use of standings at some distance from the village, but this is as far as it has been possible to progress.

At the same time, a considerable degree of at least superficial cleanliness can be achieved by good *keeping* and by the storage of grain and of personal belongings in proper receptacles. On the other hand, large numbers of flies are constantly to be seen on food, on cooking utensils and on the faces of sleeping infants.

Cooking is invariably done outside in the courtyards except in the cold weather and during the monsoon. When weather conditions demand that the *chulas* are taken indoors conditions are far from satisfactory as no flues or chimneys are provided. This is another matter on which advice is being constantly given. Bathing is usually done in a corner of courtyard and this adds to the general insanitation. More and more attention is being paid to sanitation, lighting and ventilation of houses in the rural areas, but progress will necessarily be slow because, apart from other things, it involves a change in the habits of the people.

Assam.

Model regulations have been framed for the construction and reconstruction of houses in municipalities but nothing of the kind has been done for rural areas. No improvement trusts, no building societies and no industrial housing schemes exist in the province. It must be added, however, that a large number of tea-gardens have provided satisfactory quarters for their labourers.

North-West Frontier Province.

Considerable congestion and overcrowding exist in certain parts of the towns, especially those enclosed in walls and barbed wire, such as Peshawar and Kohat. The expansion which has been thus restricted in a lateral direction tends to rise in an upward direction and, as a result, houses several storeys in height are found abutting on narrow lanes with consequent loss of light and ventilation.

In 1935, fires broke out in Peshawar and Abbottabad and destroyed large areas which were congested and overcrowded. The municipal committees were advised to take advantage of the opportunity to reconstruct those areas on hygienic lines and to prevent overcrowding and congestion by restriction of the height of buildings and by prevention of encroachment on roads and drains. Unfortunately little has been done in this respect and the previous bad conditions are being rapidly reproduced.

The question of the improvement of housing and of the removal of congestion in rural areas has not so far been considered by the authorities.

Hyderabad State.

In this State there are no industrial housing schemes, but a number of mills and other industrial concerns provide accommodalion for their employees.

In Hyderabad City, housing conditions of the middle and poor classes have greatly improved owing to the activities of the City Improvement Board. Congested areas are selected and cleared and on these areas the Board constructs " model " dwellings of four types or classes. It has recently been decided to provide for all these houses water connections and a flush system of sanitation connected to the main sewers. The houses will now be sold either by immediate or by gradual payment and the funds so realized will be used for developing further areas with model buildings, so that all congested and unhealthy localities will be gradually replaced.

The model dwellings have to some extent solved the labour and middle class housing problems. Moreover, it may be noted that, in spite of recurring outbreaks of plague in the city, no rat fall or human case of plague has occurred in any of the model houses.

As regards rural areas, on the recommendation of the public health department, the revenue department has issued official circulars regarding town and village planning and improvement. Building regulations are now being enforced in all towns of over 5,000 inhabitants. All buildings are inspected and reported on by the district health officer and the Deputy Director of Public Health on their tours.

Planning for improvement of a village or town is first prepared by the local fund architect and no plan is accepted until the area is inspected and plans approved by the public health department. Special attention is paid to the survey and treatment of malarious areas. Each scheme is next considered by the district board concerned and suggestions made by the health department are incorporated.

The question of labour colonies is under consideration and lay-outs have been approved by the public health department. In other areas industrial firms are providing quarters for their employees and in such cases the public health department only gives advice when this is requested. No powers exist in the Factory Act except that civil surgeons as certifying surgeons have powers of entering any factory and examining the premises. The civil surgeons report on the general sanitation, ventilation, lighting, latrines and water supply. No powers exist under which certifying surgeons can inspect the houses provided by factories. Government is being approached to give their public health officers special powers to inspect and report on housing, health and industrial hygiene, including industrial diseases and health administration, as suggested in the Labour Commission's report. On the promulgation of such powers, the survey of industrial areas will be made in accordance with the Report of the Royal Commission and the Mining Act. In one colliery the supervision of sanitation is directly under the control of the Director, Medical and Public Health Department. Here housing conditions are fairly satisfactory and general sanitation is receiving adequate attention.

Mysore State.

Official and local body agencies.—The City Improvement Trust Board and the City Municipality are working out housing schemes in Mysore city.

Municipal Councils are empowered to frame bye-laws for house construction under the Town Municipalities Act of 1933, but these must receive prior sanction of Government. For minor municipalities, Government have framed special rules, whilst for rural areas Village Panchayats can regulate house construction by the grant of licenses.

Under Takavi Loans Rules, loans are granted for the construction of tiled houses in rural areas and under Malnad Ryots Privileges building materials are granted to ryots at concession rates. Local officers assist rural villagers in the selection of sites for houses.

During 1935-36, 26 house-building societies were in existence, their membership totalling 3,268 and the share capital being Rs. 1,08,638. Their total working capital amounted to Rs. 6,88,053 and deposits to Rs. 1,89,111. These building societies functioned only as credit institutions to help members with loans for house construction. No house-building society has yet taken up construction work or the supply of building materials to its members.

Industrial Housing.—The mining authorities in the Kolar Gold Field and Sanitary Boards Areas have constructed several colonies under modern sanitary conditions for the use of their employees. Facilities such as play grounds, maternity houses, etc. have also been provided. In the Sanitary Mining Board Area, plots of ground have been assigned to employees on low monthly rents of eight annas to one rupee ; the employees construct their own houses on these plots.

For employees of the Mysore Iron and Steel Works, Bhadravati, 12 bungalows, 200 cottages and 14 workmen's lines have been built providing accommodation for 350 families. The rent levied is five per cent of the capital value of the building. Revenue from rents is spent on repairs to buildings, lighting, water supply and general sanitation of the colony.

In addition, the company maintains other labour colonies where the employees are permitted to build houses after an approved plan, water, lighting and sanitary arrangements are provided at the expense of the company and materials for house construction are issued by the company, the value being recovered in easy instalments. Four such colonies provide accommodation for about 800 families.

The Mysore Paper Mills Ltd. Bhadravati, has provided seven types of buildings for the use of their workers. Electric light, a piped water supply and an underground sewerage system have also been provided.

The Bangalore Woollen, Cotton and Silk Mills Co., Ltd., has constructed two main blocks of 60 houses each and one smaller block of 24 houses but this accommodation is provided only for those employees whose service ranges between 5 and 17 years and whose pay is less than Rs. 25 a month. Street lighting and water flush-out lavatory for every house have also been provided. The occupants are permitted to cultivate vegetables on a small plot of ground in the neighbourhood. Internal affairs are managed by a "Village Panchayat" composed of elected representatives on the basis of one representative for every 10 houses.

The preceding paragraphs make it clear that, with few exceptions and then only in isolated cases, the housing problem has nowhere been given anything like adequate attention. The responsibility for action lies primarily on the provincial Governments and on the local authorities. It is fairly obvious that no immediate large-scale attack on the problem is possible, partly because of the great expenditure involved and partly because, as in the case of other social ameliorative measures, a housing campaign can only be assured of success when it is supported by an enlightened public opinion. In the average village, the Indian home is kept scrupulously clean in accordance with traditional ideas of hygiene, but the villager sees nothing objectionable in the accumulation of refuse in the vicinity of his house nor is he usually aware of the danger of the pollution of soil and water. He is, in fact, no different in these respects from the agricultural peasants of other and more advanced countries. Radical improvement of present conditions will, therefore, only follow when the people become sufficiently educated to demand a higher standard of communal hygiene, both in urban and rural areas. The necessary advance in knowledge can be assisted by Public Health Departments, Education authorities and by all who are interested in the general welfare of the people of this country. But side by side with these educational activities, administrative action is essential. A number of years ago, the Madras Government placed a Town Planning Act on the statute book and shortly afterwards secured the services of a town-planning expert. The Government of Bombay has also passed a Town Planning Act, which has been used with good effect. Other provincial Governments might with advanatge follow these admirable examples. There can be no question that in the interests of orderly development of community life, the allocation of available space should be carefully planned and this can only be carried out if the necessary expert advice is available.

Industrial development particularly requires skilled guidance and the lack of such guidance has resulted in deplorable conditions in a large number of Indian cities and towns. It is certain that industrial areas should be entirely separated from purely residential localities, as the haphazard agglomeration of dwellings, factories and other industrial concerns must interfere seriously with the harmonious development of community life in the areas concerned. For this development, adequate provision must be made for community needs, such as play grounds, places of religious worship, schools, markets, halls etc.

and space for these amenities is not likely to be obtained where factories and other industrial establishments compete for all available space. It is, therefore, essential that provincial Governments should possess powers to control such developments and should be in a position to offer expert advice and guidance in town planning to their local authorities. Much avoidable damage has already been done, but many areas can still be saved from the horrible results of indiscriminate development, if action be taken without further delay.

The information collected from different provinces seems to indicate that separate treatment is required for the three types of area, the village, the small town and the city. In some provinces, the Local Self-Government Acts for small towns differ from those regulating the larger municipalities. Housing conditions also are to a considerable extent different in the three areas, whilst financial resources are bound to vary greatly. Administrative action, therefore, must necessarily be on divergent lines in each of these cases.

For rural areas, the measures to be adopted should be framed on simple lines. The work which has been done during recent years in the Punjab by Mr. Brayne has proved that, in regard to environmental sanitation, house ventilation, lighting and so on, many existing defects can be rectified by means of friendly advice and persuasion. In respect of new construction or reconstruction, type designs suited to rural conditions should be prepared and certain minimum standards prescribed by public health departments. In order to ensure that these are complied with, powers of supervision might be given to village *panchayats* instituted as the village authority for local self-government.

In the small towns, where corporate life may be expected to have reached a higher standard than in rural areas, it is desirable that the local authority should employ at least one officer with some training and experience in public health. In some of the smaller centres a trained Sanitary Inspector might suffice, but he should, in addition to his ordinary qualifications, possess some knowledge of the housing question, if he is to be in a position to advise the town council. In other and larger towns, it should be the policy to appoint trained second class Health Officers. In either case, it is essential that these local officers should be subject to the supervision of the District Health Officer who will ordinarily be a member of the provincial Public Health Department. Only in this way will the necessary uniformity and control be obtained; only in this way will the desired improvements be effected.

The large towns and cities usually have their own public health services, either independent of or recruited from the Provincial Department. In either case, the local municipal council should welcome the advice of officers of the governmental Public Health organisation and should be able to obtain guidance in town-planning, in zoning and in the regulation of house construction from Government experts in these matters.

It is difficult to see how the problems associated with housing can be dealt with apart from those relating to general public health administration and the whole question should inevitably form one of the most important functions of the health committee of a local authority. If this be accepted, both the municipal health officer and the municipal engineer will be intimately associated with every project which the health committee may have under consideration and these officers should also bring to the notice of their health committee every case which appears to them to be of urgent importance to the health of the urban community which they serve.

The proper housing of the people is one of such vital importance to the general welfare that the policy to be adopted must inevitably be determined by the government itself, whilst the financial responsibility should be shared by provincial governments and the local authorities in such a way that suitable governmental control will ensure the carrying out of the agreed policy. Experience has already indicated that the system of percentage grants from government not only stimulates local action but provides justification for the supervision of all housing schemes by officers of the governmental organisations concerned. The same system will encourage industrial employers to extend their expenditure on the provision of houses for their workers, for particularly in those urban areas where rapid industrial development takes place, the large influx of labour frequently renders existing housing completely inadequate and may create a problem of such magnitude that the local authority is unable to meet the situation.

At provincial headquarters, it may be found convenient to constitute an expert committee, the members of which should include the Director of Public Health, the Director of Town Planning and the Sanitary Engineer to Government. Such a committee is qualified to offer technical advice to Government, to local authorities and to industrial concerns and should supervise every scheme in order to ensure that it conforms with all sanitary requirements in respect of the health, safety and comfort of the community concerned. On this committee will devolve the duty of preparing suitable lay-outs and suitable type designs for houses of different grades and their appurtenances such as latrines, cook-houses, cattle sheds, etc. In the general layout of each scheme, it will also give due regard to the provision of schools, playgrounds, markets and other social amenities. The sanction by Government of all housing schemes will depend to a considerable extent on the advice received from the expert committee and the position of detachment which this advisory body occupies should ensure that its advice is completely impartial.

Industrial Hygiene.

54. Since the Royal Commission on Labour in India issued its report nearly seven years ago, increasing attention has been paid to the conditions of factory labour by governments, the legislatures and the general public and action has been taken in many directions to implement the recommendations made in the Commission's report. Whilst it is true that agriculture is, and will continue to be, the staple industry of the country, the wave of economic nationalism, which has swept over the world, has not left India untouched and it is probably correct to say that the coming years will witness a steady growth of industrialism in this country. The development of electric power, in view of the scarcity of coal, is being actively pursued by more than one provincial government, whilst the encouragement of cottage industries has been taken up as a hopeful line of advancement. Under these circumstances, the health of the industrial worker is a matter of serious concern to the State.

In a country like India, with its large rural population and with agriculture absorbing the bulk of labour, sound economic development is bound to proceed on lines somewhat different from those of a highly urbanised country like England. The future of industrial development in India, indeed, is more likely to be in the direction of a linking of agriculture with small scale industry, planned to supplement the income of the rural labourer and to provide him with employment during the months of enforced idleness, which agriculture with its dependence on monsoons makes a constant feature of village life. It cannot be assumed that workers engaged in small scale industries

require less protection than those employed in the larger industries. On the other hand, as the International Labour Office Year-book for 1936 points out in respect of Germany, " special attention is paid to handicraftsmen and workers in small undertakings, on the ground that they are more exposed to occupational risks than workers in large-scale industries." Nor should it be forgotten that the evils attendant on concentration of factory labour and the consequent development of slums already exist in more than one of the large industrial centres of this country.

The whole question of the health of the industrial community is so important that it has been considered desirable to include in this section of the present report a brief summary of recent legislation dealing with the health and welfare of the Indian industrial worker. As a matter of convenience, the various items are dealt with under separate headings.

Health and safety.—

(1) Provision has been made whereby the Inspector can require individual factory owners to adopt specified measures in respect of the regulation of humidity and temperature.

(2) Provincial Governments have been empowered to lay down standards and methods of ventilation and an obligation has been imposed on the employer to take adequate measures to protect the health of the workers in places where dust or other impurities are generated during the course of work.

(3) Powers have been given to Provincial Governments (*a*) to specify as hazardous any operation involving a serious risk of bodily injury, poisoning or disease ; (*b*) to prohibit or restrict the employment on it of women, adolescents and children and (*c*) to secure the medical examination of all persons employed or seeking employment and to provide for their protection.

Rules have already been issued relating to such occupations as lead processes, the manufacture of aerated waters, work with rubber solutions and soluble chromium compounds, cellulose spraying and sand blasting.

(4) In respect of the welfare of workers, (*a*) Provincial Governments have been empowered to insist on the provision and proper custody of first aid boxes in the larger factories ; (*b*) provision has been made for the supply of washing water for all workers dealing with injurious or obnoxious substances. The supply of drinking water for all operatives had already been the subject of regulation ; (*c*) Provincial Governments have been enabled to insist on the provision of crêches in factories where 50 or more women are employed ; and (*d*) Acts are in operation in the provinces of Bombay, Madras, Central Provinces, Ajmer-Merwara and Delhi granting maternity benefit to women workers and requiring their compulsory abstention from work during 6 to 8 weeks centred on the date of delivery.

Owners of plantations in Assam, have also, of their own accord, made provision for maternity benefits for their women employees.

Children and adolescents.—

(1) The pledging of child labour by parents for loans has been rendered illegal and penalties have been provided for persons making such Agreements.

(2) The Factories Act prohibits the employment in any factory of children under 12 years of age. No child over 12 years, and no adolescent between 15 and 17 years is allowed to work in a factory without a certificate of fitness granted by a certifying surgeon and the child or adolescent must, while at work, carry a token giving a reference to such certificate.

(3) By a provision in the Indian Ports Act Provincial Governments are required to make rules prohibiting the employment of children under 12 as dock workers.

(4) Children under 15 are excluded from all occupations declared hazardous under the Factories Act, except aerated water factories, and also from a series of factory operations relating to the manufacture and use of explosives, from certain glass manufacturing processes, from handling wool, hair, bristles, hides and skins and from certain ceramic and cement processes. Adolescents are also excluded from a majority of the occupations which have been declared hazardous under the Factories Act.

Housing of industrial labour.—

The Land Acquisition Act has been made applicable to industrial concerns, employing 100 or more workers, for the construction of workmen's dwellings and for the provision of amenities connected with housing.

Dock labourers.—

The Indian Dock Labourers Act of 1934 seeks to protect dock workers on the lines proposed by the Draft Convention of the International Labour Conference in 1932 and an extensive code of regulations is under preparation for enforcing safety measures. The regulations will be framed in accordance with the decision of the Reciprocity Conference, with adaptations suitable to Indian conditions.

Indebtedness.—

(*a*) Complete protection has been provided for workmen paid not more than Rs. 100 a month against attachment of their salaries by court decrees.

(*b*) Liquidation of debts of industrial workers was the subject of recommendation by the Labour Commission. In this connection no all-India legislation has been passed, but the legislature of the Central Provinces has enacted a measure affording a considerable measure of relief to industrial workers receiving not more than Rs. 50 a month.

(*c*) A recommendation of the Commission relating to the prevention of intimidation for the recovery of debts has received legislative sanction in Bengal and the Central Provinces.

Fines.—

(*a*) Fining of children is prohibited.

(*b*) The maximum deduction should not exceed in any month half an anna in the rupee of the worker's earnings.

(*c*) Fines collected should be credited to a purpose beneficial to the employees as a whole and approved by the competent authority.

(*d*) Employers are required to post notices specifying the acts or omissions in respect of which the fines are levied. The list has to be approved by competent authority. For unspecified cases fines are illegal.

(*e*) Recovery of fines should not be made by instalments but on a single occasion and within 60 days.

Workmen's compensation.—

The Labour Commission expressed the opinion that an extension of the classes of workmen covered by the Act was essential and suggested that "the method of advance should be to include first workers in organised branches of industry, whether they are hazardous or not, and secondly to extend the Act gradually to workers in less organised employment, beginning with those who are subjected to most risk." The Act, which was revised in accordance with these recommendations, now covers about six million workers as against four millions previously. "The Act now applies to workmen in scheduled classes subject to the maximum wage limit of Rs. 300 a month. In the case of the bulk of railway servants this limit is not applicable." Certain hazardous occupations connected with work in forests were brought within the scope of the Act, as also workmen engaged on ships of all nationalities whilst within Indian territorial waters.

Scales of compensation have been liberalised. Other provisions included the abrogation of the rule that the dependents of a case of fatal accident should not receive compensation if the accident was due to the workman's wilful disobedience or intoxication. The list of dependents was enlarged and various suggestions of the Royal Commission for enabling dependents to secure their rights under the Act have received sanction of the legislature.

On the introduction of the Government of India Act of 1935 on 1st April 1937, an Order in Council transferred to provincial governments the power of adding by notification new classes of workmen, for introducing to the schedule new industrial diseases and for making rules governing procedure.

Plantation labour.—

The Tea Districts Emigrants Labour Act, 1932, introduced many measures designed to improve the condition of plantation labour, the more important of these being (*a*) the appointment and maintenance of a Controller of Emigrant Labour, (*b*) the grant to the labourer of the right of repatriation, (*c*) the declaration of recruiting areas as Controlled Emigration Areas, the recruitment in such areas being restricted to agents under license and subject to various restrictions designed to prevent misrepresentation and to ensure the comfort of the recruit on his journey and (*d*) provisions to safeguard the health of those recruited, to protect women and children, to secure the punishment of offences and other miscellaneous purposes.

In addition, legislation in other directions dealt with industrial disputes and labour in mines.

From the above summary, which makes no claim to completeness, it will be observed that within recent years considerable activity has occurred in the sphere of legislation referring to Indian industry and many of the new regulations and enactments are bound to effect desirable improvements in the health and well-being of the Indian industrial worker.

Industrial disease.—

The low incidence of industrial diseases recorded in India was emphasised by a number of witnesses appearing before the Royal Commission on Labour. A recent reference to the provincial Directors of Public Health and Commissioners of Labour has indicated that information on this subject is still scanty. For instance, the Commissioner of Labour in Bombay has reported that only two cases of industrial diseases have so far been dealt with under the Workmen's Compensation Act.

The Government of Bengal have reported a number of suspected cases of lead poisoning in the Government Press, 65 cases being recorded in 1936

and 13 in 1937. The Director of Public Health of Burma has supplied the following figures for lead poisoning relating to the Burma Corporation's employees.

	Lead poisoning.	
	Attacks.	Deaths.
1927	51	1
1928	42	..
1929	16	1
1930	8	..
1931	..	..
1932	2	..
1933	..	..
1934	5	..
1935	1	..
1936	3	..

In addition, it is stated that two cases of miners' phthisis were reported by the Burma Corporation during 1928. Except in these instances, other replies were to the effect that no information was available.

It must be remembered that notification of industrial diseases does not yet exist in India. In England, under section 73 of the Factory and Workshop Act, 1901, medical practitioners are required to notify to the Chief Inspector of Factories certain diseases contracted in a factory or workshop. In India, the Factories Act makes no such provision; but anthrax is notifiable under the local Self-Government Acts of some provinces although not as an industrial disease and no statistics relating to the incidence of anthrax are available. Further in the Workman's Compensation Act certain occupational diseases have been scheduled and if a workman, who has been continuously in employment for a period of not less than six months, contracts any of these diseases the presumption is that it has been acquired in the course of his employment. For this purpose the names of the occupational diseases and the corresponding employments have been notified by Government. These are :—

Occupational Disease.	Employment.
1. Lead poisoning or its sequelae	Any process involving the use of lead or its preparations or compounds.
2. Phosphorus poisoning or its sequelae	Any process involving the use of phosphorus or its preparations or compounds.
3. Mercury poisoning or its sequelae	Any process involving the use of mercury or its preparations or compounds.
4. Poisoning by benzene and its homologues, or the sequelae or such poisoning.	Handling benzene or any of its homologues and any process in the manufacture or involving the use of benzene or any of its homologues.
5. Chrome ulceration or its sequelae	Any process involving the use of chromic acid or bichromate of ammonium, potassium or sodium, or their preparations.
6. Compressed air illness or its sequelae	Any process carried on in compressed air.
7. Arsenical poisoning or its sequelae	Any process involving the production, liberation or utilisation of arsenic or its compounds.
8. Pathological manifestations due to— (a) radium and other radio-active substances; (b) X-rays.	Any process involving exposure to the action of radium, radio-active substances or X-rays.
9. Primary epitheliomatous cancer of the skin.	Any process involving the handling or use of tar, pitch, bitumen, mineral oil, paraffin, or the compounds, products or residues of these substances.
10. Poisoning by exposure to nitrous fumes.	Any process involving exposure to nitrous fumes.

The operation of the Act may, therefore, be expected gradually to throw some light on the incidence of occupationa ldiseases. The report on the working of the Act for 1935, however, states that only two claims based on industrial diseases were made during the year, one in Bengal for alleged lead poisoning and the other in Bombay for compressed air illness, while the total cases numbered 22,999. The report for 1936 mentions 8 cases of compensation for lead poisoning and states that " there is evidence that this occupational disease is far more common than the figures suggest ". For assessment of the importance of industrial diseases in relation to public health, therefore, the working of the Workmen's Compensation Act appears so far to have afforded little information. The Labour Commission, whilst they anticipated that with the employment of skilled observers the usual diseases associated with industry would be found to exist in India, were of opinion that the time had not yet arrived for the introduction of compulsory notification.

Medical care of the industrial worker.—

Provision for periodical medical examinations of the worker is a sound investment from the point of view both of industry and of the State. " The human being is a finely adjusted physiological instrument, which must no longer be wasted, much less destroyed, by ignorant or wilful misuse. A working man's capital is, as a rule, his health and his capacity to perform a full day's work. Once that is impaired or damaged beyond recuperation two things happen. First, his whole industrial outlook is jeopardised and he becomes by rapid stages a liability and even a charge on the State. Secondly, if the bodily defence is undermined by stress and strain the man falls a steady prey to disease." It is therefore essential to the worker that his health should be maintained and that his working capacity should remain undiminished. The experience of certain insurance companies, which provide facilities for a periodical free medical examination to their policy holders, has been that the money spent on this service is amply repaid by the longer expectation of life of their clients resulting from the advice and guidance that such periodical examinations place within their reach. In the case of industrial workers the strain of life is greater and similar medical examination would in many cases prevent the undermining of health which results from the adverse effects of work in factories and mines. A medical service for workers should therefore not only include aid during illness but should provide continuous supervision with a view to the correction of unhealthy habits of life and the regular assessment of any ill effects produced by their occupations. Fortunately, the importance of such services is being more and more recognised by the governments of progressive countries, although in India except in respect of provision for the six-monthly examination of lead workers, no system of periodical medical examination so far exists in the industrial field.

A further question arises in connection with the provision of medical treatment for industrial workers during periods of illness. A considerable number of large employers of labour, such as the railways, plantations and a few of the cotton and jute mills, have made arrangements, some efficient and others deficient, for the medical care of their sick employees, but taken as a whole, provision for treatment of the sick worker is not a common charge on industry in this country. As the Labour Commission's report pointed out, " by common consent the incidence of sickness is substantially higher than in Western countries ; the medical facilities are much less adequate, and the wages generally paid make it impossible for most workers to get through more than a very short period of illness without borrowing. Indeed, sickness is an important contri-

butory cause of indebtedness, with all that debt entails under existing conditions; for often, at his greatest time of need, the worker may find himself destitute of resources, unable to take proper measures to restore his health and in difficulties regarding even the means of subsistence." Whilst a service providing continuous medical care for the industrial workers is no doubt eminently desirable, in view of present-day conditions in most parts of India, the more reasonable requirement appears to be the provision of adequate facilities for treatment during sickness. The Royal Commission noted three types of industrial area, (1) where industry has gradually grown in a large town possessing medical facilities for the general population and the employers have not supplemented by their own efforts available medical resources, (2) where with a rapid growth of industry the workers have become a disproportionately large section of the population and (3) where new industries have been started in a rural area, *e.g.*, the Tata Iron and Steel Company at Jamshedpur and the Burma Corporation at Namtu. In regard to the last class the Commission held that responsibility should rest on the industrial corporations themselves, but with respect to the first two, they stated that :—

> " The time has come when the whole position in urban and industrial areas should be surveyed and an estimate made of the requirements of each, due consideration being given to already existing facilities, whether Governmental, municipal or industrial. We recommend that these surveys should be made by the Government medical departments through their Civil Surgeons and that the information thus made available for each area should be considered at a joint conference of the representatives of the three interested parties. While the primary responsibility will and must remain with Government and with local and municipal authorities, we believe that in many cases the employer would prefer to provide medical facilities for his own workers, if he were given some assistance and co-operation from Government and the local authorities. In other cases, with or without aid from Government, the local authority might provide the additional facilities required and recover the cost from increased taxation. Decisions on these and other methods could be made at the conferences we have suggested, as we regard co-ordination of effort to be essential..... Governments could also enhance general progress by making percentage grants for such additional facilities as they approve. This method to which reference has already been made, would give Governments power to supervise and inspect and to insist on minimum standards. In our opinion it is greatly to be preferred to the system of giving lumpsum grants without subsequent supervision as it not only maintains a measure of control, but also necessitates the raising of an equivalent amount by local taxation."

In most of the cities and large towns where industrial development has taken place the provision of medical aid even for the general population is frequently inadequate and if, by joint efforts, Governments, municipal authorities and employers of labour were able to increase existing facilities, benefit would accrue to all. The recommendations made by the Labour Commission on this subject have not, so far as is known, been adopted in any industrial area in India and it seems deserving of more attention from all three parties concerned.

The separation of industrial and residential areas.—

Any large town in India can provide examples of industrial establishments located in the midst of residential areas. The Labour Commission recognised the necessity of early action in this direction and suggested that many of the difficulties of town planning could be avoided by the application of the principle of ' zoning ' and the prevention of haphazard industrial development. They suggested that the example of Madras Presidency, which possessed powers under a Town-Planning Act, might with advantage be copied by other provinces. Even in this province, however, the efforts of the Public Health Department to

control the establishment of new factories have been largely ineffective. In his report for 1936 the Director of Public Health, Madras, has remarked that :—

" The provisions in the Indian Factories Act for industrial control are supplemented by certain sections in the District Municipalities Act and the Local Boards Act. Smaller factories are entirely governed by these sections which are administered by the local bodies and their executive officers. No factory workshop or workplace using power could be constructed without the previous permission of the local authority and the latter should consult their Health Officer and have due regard to his opinion about the suitability of the site before such permission is granted. In spite of this useful safeguard, instances are not wanting where the local authorities have disregarded the opinion of the Health Officer. Where there is a difference of opinion between the local authority and the Health Officer it is always advisable for the local authority to consult the Director of Public Health before final action is taken. Although the Government advised the Municipal Councils and *Panchayats* as early as 1927 to set apart definite areas within their jurisdiction for industrial developments and to refuse permission for the establishment of factories, etc, outside such industrial areas, several of them have yet to take action in the matter. The delay in fixing industrial areas is causing unnecessary complications, as the prospective factory owners generally want to construct the factories wherever it is convenient for them and very often in the heart of the town unmindful of the health and comfort of their neighbours. A factory once established in a residential locality cannot later on be removed from there without much trouble and financial loss. The Municipal Councils and *Panchayats* should therefore be very vigilant in controlling the establishment of new factories if they wish to escape the plight of some of the industrial towns in the West."

This is another matter deserving much more attention than it has hitherto received from provincial governments and local authorities. By efficient town planning it is possible greatly to minimise overcrowding, slum conditions and the other attendant evils with which rapid industrialisation seems to be so frequently associated. Legislative powers such as those already in existence in Madras Presidency are essential if satisfactory control is to be maintained and prompt and energetic action is necessary if further unsatisfactory developments are to be prevented.

Whilst no attempt has been made to survey the whole field of industry in relation to the health of the worker, enough has perhaps been said to show that in India a number of important problems require attention especially in those areas which are witnessing a steady growth of industrialism. " Experience has shown that almost every advance in industrial methods means the birth of some baffling new problems and that tens, perhaps hundreds, of workers will suffer and many even die before effective preventive measures can be evolved." This quotation, taken from an English journal, is given in order to stress the importance of industrial health research. In England, the investigations which have been carried out in the industrial field, especially in the post-war period, have been of the greatest value both in increasing efficiency and in adjusting the worker to his task. In the words of Sir George Newman, " we need not only more ' goods ' but better men and women,—more competent and efficient, with more energy, with greater love of their craft, with an ever expanding capability of enjoyment in their labour." It is by no means always possible to apply the findings of research in one country to the problems of another, where conditions of climate, diet and habits of life may be very different. In regard to India, moreover, as the Labour Commission pointed out, one of the main tasks of research is so to devise the conditions of life in industrial centres as to make it possible for the agricultural labourer recruited from the rural areas to adjust himself to the changed environment of factory life without impairment of his health and efficiency. This question is one of vital importance to Indian industries and is one which can be adequately dealt with only by means of close co-operation between the central and provincial governments on the one hand and industrial employers on the other.

Mines and Factories.

55. In the following paragraphs has been given such information as is available in provincial health reports regarding public health in mines and factories. The housing of industrial labour has been dealt with later in this section (Section IV) along with the housing of the general population in urban and rural areas.

The daily average number of persons working in and about mines regulated by the Indian Mines Act was 269,593—underground 130,724, open workings 69,193, and surface 69,676. The numbers of women included in these three categories were 7,301, 17,071 and 18,263, respectively.

Fatal accidents numbered 214 and in addition there were 978 serious accidents to 1,011 persons involving permanent loss of or injury to sight or hearing, of fracture of a limb or enforced absence from work for a period exceeding 20 days. Many of these accidents were due to falls of the roofs and the sides of the mines. Suffocation from gas was responsible for one fatal accident involving the death of 35 persons ; explosives for 11 fatal and 24 serious accidents ; and haulage for 24 deaths and 189 accidents.

Bihar.—The Jharia Mines Board of Health continued to control the sanitation of Jharia and the neighbouring mining area covering 787 square miles with an estimated population of 550,056.

The total births numbered 13,781 or 25·9 p.m. and deaths 8,556 or 16·1 p.m., the decrease in the latter being ascribed to the absence of cholera epidemics. The infant mortality rate was 108 p.m. live-births.

Cholera was the cause of 64 suspected cases and 39 deaths, smallpox 3,733 and 329, fevers 5,595 cases and respiratory diseases 428, whilst 217 cases of venereal diseases were reported in the collieries. A total of 6,350 anti-cholera inoculations and 75,840 vaccinations were performed.

Drainage and sanitation were satisfactory. A five year's programme of housing improvement was enforced. A total of 483 food samples was analysed in the Board's laboratory.

As regards maternity and child welfare, 13 centres were at work in charge of three qualified health visitors. Most of the normal labour cases were attended by trained *dais*.

Leprosy relief work within the Jharia mining settlement was carried on by the Dhanbad and district leprosy relief fund, which maintained three clinics. Treatments numbered 22,984. It was decided to undertake a sample leprosy survey of the colliery area, to establish a fully equipped hospital and a central clinic at Tetulmari, to appoint a resident assistant leprosy officer for each clinic and to introduce a travelling clinic for purdah women or disabled persons.

Classes in first aid were held at 12 centres in the Jharia coalfield and in the mining areas of Sambalpore and Hazaribagh. In all 256 students attended

these classes and 219 certificates were issued. In the Raniganj coalfield similar classes were held at seven centres and 116 certificates were issued.

Bengal.—In the Asansol Mining Settlement, 434 cholera cases with 180 deaths were recorded as against 1,144 and 616 in 1935. A total of 61,157 persons were inoculated. Smallpox showed a considerable increase with 925 cases and 79 deaths as compared with 123 and 20 in 1935 and 156,254 persons were vaccinated. Malaria continued to decline in incidence. The Asansol Mines Board of Health maintained a staff of six health visitors and a lady superintendent for maternity and child welfare work. The four infant welfare centres situated near important groups of collieries were attended by 235 infants and 105 toddlers whilst 131 labour cases were dealt with by the health visitors. Trained dais numbered 71. Classes in hygiene and mother-craft were attended by 103 mothers and 35 girls. Baby shows were arranged in eight areas and a health exhibition was also held. Training centres were opened in boys' and girls' schools for first-aid, home nursing and mother-craft, and an inter-school and inter-colliery ambulance competition was organised. A detailed survey resulted in the discovery of 4,747 cases of leprosy, this figure giving an incidence rate of 1·3 per cent. for the total population. The number of leprosy clinics was increased to 14 and four leprosy officers were employed. A staff of 12 trained leprosy health visitors was maintained for survey and propaganda work and for home visiting.

C. P.—Sanitary arrangements were fairly satisfactory in most of the perennial and larger seasonal factories. The problem of the disposal of malodorous effluents from rice mills was still awaiting solution. Better facilities for the storage of drinking water were needed in many places and conservancy arrangements were generally defective. Methods of ventilation and air cooling in cotton mills were for the most part of a satisfactory standard. Housing conditions were only fair; factory and mill employees residing on premises owned and controlled by employers numbered about 19,000.

The general health of factory workers was reported to be good and no outbreak of epidemic disease was recorded. The 14 factory dispensaries at work dealt with 216,535 cases. No cases of occupational disease were observed.

Malaria was the chief cause of sickness in the Ballarpur mines in Chanda district. An outbreak of cholera caused 89 cases with 61 deaths and 3,473 anti-cholera inoculations were performed. Smallpox was responsible for 47 attacks and four deaths in the Balaghat and Chanda districts. Influenza prevailed in mild form in the Chhindwara district mines, 526 cases being reported with no deaths. In the Betul and Chanda district mines, malaria was responsible for 1,184 cases with seven deaths. Fifty-five attacks and 7 deaths from bacillary dysentery occurred in Chanda.

The main colliery hospital at Parasia in the Chhindwara district and the dispensaries at the Mahakali and the Ballarpur collieries in Chanda district continued to provide medical aid for the mine labourers. The C. P. Manganese Ore Company, Ltd., maintained three dispensaries in Balaghat district. An outbreak of cholera, due to contaminated drinking water, occurred during July and September amongst labourers in Chanda district and was responsible for 84 cases and 51 deaths.

Bombay Presidency.—In Ahmedabad and Dhulia, nuisances caused by improper disposal of trade wastes were the cause of a number of complaints. In some cases, an endeavour was made to abate the nuisance by sprinkling the waste water through hydrants on waste land near the factories, but where such land was not available the products were allowed to accumulate outside the premises. The Ahmedabad suburban new drainage scheme will, it is hoped, be able to cope with these effluents. In the case of Pratab Mills at Dhulia the mill authorities were advised to treat their effluent before it passed into the city drains.

Madras Presidency.—District and municipal M. O. Hs., who are additional inspectors of factories, inspected 648 factories.

The Health Officers inspected the sanitary conditions of 88 mines in their respective areas. In the districts of Chingleput, Salem, Nellore, Kistna and Coimbatore, the District M. O. Hs. were *ex-officio* inspectors of mines.

Assam.—Sanitary conditions on the tea gardens were generally satisfactory. Special regulations exist under the Emigration Labour Act, 1932, for the sanitary supervision of tea estates, whilst sanitary control of factories and offensive trades is effected under the Indian Factories Act. The Assistant Directors of Public Health have now been appointed additional inspectors of factories within their respective jurisdictions.

Burma.—(*a*) *The Burma Corporation, Ltd., Namtu.*—Malaria, which was the main cause of sickness, accounted for 5,597 cases of which 61 proved fatal; bacillary dysentery 178 and five respectively; amoebic dysentery 53 and one; enteric fevers 86 and 14; pneumonia 82 and 20; diphtheria five and one; tuberculosis of lungs 83 and 17; blackwater fever five and four; puerperal sepsis 25 and one; epidemic dropsy 20 cases; beriberi 2 cases; ankylostomiasis 60 cases; and dog bite 31 cases.

Cholera and smallpox were absent. Of three cases of lead poisoning, two were opium addicts. A total of 4,681 employees was examined for stippling of the blood and 564 were found positive.

Normal labour cases numbered 232 and abnormal cases 24; one death occurred among the latter.

(*b*) In Mergui district the general health of the mines labour forces was reported to be satisfactory, as were also food supplies, water supplies and housing accommodation. In Tavoy District, the general health of the labourers was good. No outbreak of epidemic disease occurred but during the rains malaria was prevalent in most mining areas. In three cases small mines hospitals were in charge of sub-assistant surgeons and three others had only compounders. In some areas provision was made for first aid dressings and for simple drugs. Housing conditions and sanitation were generally good. In the Thaton district, the labourers were provided with barrack accommodation and at each quarry first-aid equipment was available.

Railways.

56. Each Railway Administration has a Chief Medical Officer, under whose direction medical and health work is carried out by a number of District Medical Officers, Assistant Surgeons and other subordinate staff. The Railway Authorities have recognised the advantages of combining, under one administrative head, the curative and preventive functions of their medical staffs and all Chief Medical Officers are, in consequence, required to possess a recognised public health qualification. This unification of the two departments of medicine is a step in advance of that obtaining in provincial organisations and the results obtained from this effort at co-ordination are bound to be of interest to all administrative officers in the medical and public health fields. Railway administrations have important preventive functions to perform. For instance, their active co-operation with provincial governments and local authorities is essential in the prevention of spread of epidemic diseases and in the sanitary control of fairs and festivals. Again, the important question of joint action in respect of health problems, such as malaria, common to civil, railway and cantonment authorities, was rightly stressed at the inaugural meeting of the Central Advisory Board of Health and attempts are now being made in different provinces to ensure better co-ordination of effort in this direction.

All railway administrations are now accustomed to take elaborate precautions against the spread of infectious disease from the more important fairs and festivals and actively co-operate with the civil authorities in the sanitary control of these gatherings. In this connection attention is invited to the procedure adopted by the Chief Medical Officer of the South Indian Railway. In his report for 1936-37 he states that " full particulars concerning 99 major fairs and festivals have been drawn up and an agreement arrived at between the South Indian Railway and the Director of Public Health, Madras. These particulars will be incorporated in standing orders ". Joint consultation between provincial health authorities and the railway medical departments and the formulation of co-ordinated action in the prevention of the spread of disease are essential both in the interests of health administration and of the convenience of the travelling public.

Although, no doubt, many would maintain that the primary function of these medical services is to render medical aid to the railway employees, their activities extend in many other directions including training in first-aid, anti-malaria operations, protection of water supplies, the provision of drainage in railway colonies and the development of maternity and child welfare centres. Reference to these and other questions will be found in the following summarised accounts of the work of a number of the railway medical departments at work in this country.

Bombay, Baroda and Central India Railway.—Out of 365,404 cases treated in hospitals and dispensaries during 1936-37, causes of sickness were classified in respect of 357,871 cases. These included air-borne diseases 59,703, food and water-borne 45,202, insect-borne 53,882, infectious diseases 942, pyrexia of uncertain origin 14,161, diseases of direct contagion 899, food deficiencies 157, injuries 27,096 and other causes 155,829. Enteric fever was responsible for 164 cases, influenza 12,557 and rheumatic fever 108. Cholera appeared in epidemic form in the Rajputana section of the railway system especially at Bandikui, 20 cases with 8 deaths being recorded. As a result of energetic measures, the epidemic was quickly brought under control. Plague

was absent. Of the 81 cases of small-pox, 42 were recorded amongst vaccinated and 39 amongst unvaccinated persons, but all the 5 deaths occurred amongst the latter. Six cases of cerebrospinal fever with 2 deaths were recorded. Surgical operations numbered 16,372. Arrangements for X-ray examinations and anti-rabic treatment were provided at Ajmer ; 244 persons received anti-rabic treatment.

Considerable antimalarial work was carried out during the year. This included such measures as clearance of rank vegetation, regular inspection of potential breeding places, spraying with malariol or paris green, filling in of pits, holes and earth cracks and the sealing of disused wells. During the past three years a steady decline in the number of primary and recrudescent cases of malaria has occurred as the following figures show :—

	Primary.	Recrudescent.
1934-35	12,587	11,741
1935-36	11,635	10,086
1936-37	7,900	8,900

Twenty-eight first-aid training classes were held and 225 of the 359 candidates obtained certificates, 6 were awarded vouchers and one a medallion.

The Madras and Southern Mahratta Railway.—Of a total of 344,542 cases treated in hospitals and dispensaries, accidents were responsible for 28,824, dysentery for 5,946, diarrhœa 4,127, malaria 5,149, typhoid fever 144, smallpox 38, cholera 30, measles 26 and other causes 300,258.

Despite the wide prevalence of cholera, smallpox and plague in adjoining areas, the railway colonies escaped with only mild or light infection. Only 32 cases of cholera with 19 deaths, 44 non-fatal cases of smallpox and one fatal case of plague were recorded among railway employees and their families. Diphtheria was the cause of six cases ; cerebrospinal meningitis was absent. The Chief Medical Officer remarks in his Annual Report :—

" The absence of a general Public Health Act for the whole of British India and the lack of interest shown in the application of the various provincial Acts and Acts of the States, concerning the notification of infectious diseases including diphtheria, has necessitated the revision of the rules on this railway concerning the notification of such diseases. It was found that there were 21 infectious diseases mentioned in the various Acts applicable to this railway system which must be notified ; of these 8 had to be notified under the Madras City Municipality Act, 15 under the District Municipalities Act, 14 under the Bombay Municipality Act and 3 in the Mysore State. This produced confusion and a comprehensive list of all the diseases included in all the various Acts has now been prepared and any case of any of these diseases is notified by the railway medical official to the local public health authorities."

A leprosy clinic was opened at Perambur. Of the 24 employees treated during the ten weeks of its work, 17 were eligible for the benefits of the special sick list including full pay for three months while not at work. In addition, 13 dependents and children of employees were treated.

Encouraging experiments were carried out (*i*) in the construction of borehole latrines and (*ii*) on the possibility of the re-use of the effluent from the sprinkler beds at Perambur in the water carriage system serving the workshop latrines. It was found practicable to re-use the effluent for the purpose of flushing latrines without seriously interfering with the purification process at the filter beds. (*iii*) An endeavour was also made to correlate the adverse effect of local environment in workshops in terms of temperature and humidity with the accident rate, which normally varies according to fatigue. Results were inconclusive but it was hoped to continue the research at a later date. (*iv*) The effect of rarified air at varying temperatures on the viability of bugs

and their eggs was studied in order to ascertain whether it would not be possible to disinfect rolling stock by cheaper and safer methods than by sealed tunnels and with hydrocyanic acid gas. The results have shown that a reduction in atmospheric pressure is of no importance in attempts to destroy bed bugs and their eggs in passenger vehicles, but that exposure to a constant temperature of 120° for 25 minutes causes the death of adult bugs and the destruction of eggs at normal atmospheric pressure at sea level.

As regards water supplies, periodical field tests were carried out by medical subordinates ; at the more important stations bacteriological examinations were also made in order to test the standard of purity and to minimise the risk of carriage of disease.

Antimalarial work was carried out at forty-six different stations.

Training in first-aid was continued and 286 employees qualified.

South Indian Railway.—General health conditions were satisfactory. Total cases treated increased by 7 per cent. to 31,704 ; these included 14,068 for infectious and 13,553 for systemic diseases ; 23 labour cases were dealt with. The total loss from sickness was 212,411 days or an average of 7 days per case. There was an increase in the number of deaths to 185 from 134 in the previous year, the death rate was 6 per 1,000 sick. Influenza was responsible for 5,335 cases, the number of days lost through this disease being 25,433. Cases of dengue were doubled at 153 ; the number of cases treated for rabies was 100. Smallpox cases numbered 33 with 7 deaths, whilst 69 cases of cholera with 42 deaths were recorded. At Villupuram, where 18 attacks and 13 deaths took place, a special temporary staff was appointed and amongst other preventive measures 1,500 persons were inoculated. Plague was absent.

Large numbers of cases of malaria were recorded both on the broad gauge line and at places such as Quilon station and Pamban ; the administration of atebrin and plasmoquine was tried as a prophylactic measure and gave satisfactory results.

Sanitation was reported to be fairly satisfactory. The water supplies of 19 important stations were tested by analysis at the King Institute once a quarter. The laboratory at Golden Rock carried out repeated analyses of the drinking water of 80 stations and about 1,400 analyses of different samples of Golden Rock water.

The Railway maintained five hospitals which treated a total of 2,151 in-patients of whom 18 died.

Sixty-nine subordinates were granted first-aid certificates.

Station refreshment rooms were regularly inspected.

Great Indian Peninsula Railway.—A total of 194,460 cases were treated in hospitals and dispensaries. The number of days of certified sickness totalled 706,002, the loss on this account amounting to Rs. 12,09,510. The more important causes of sickness were malaria 8,180 cases, other fevers 19,006, influenza 12,511, venereal diseases 1,004 including gonorrhœa 397, soft sore 105 and syphilis 502, tuberculosis of the lungs 178 (with 12 deaths) and enteric fever 77. As regards cholera 45 cases were recorded with 21 deaths ; plague 9 and 3 ; and smallpox 230 and 14. A total of 229 cases was given anti-rabic treatment in the centres at Byculla, Bhusaval, Jhansi, Sholapur and Igatpuri.

The usual anti-malarial measures were carried out for destruction of larvae and prevention of breeding, but it was reported that these efforts were largely nullified by the absence of similar measures in areas outside the control of the railway authorities.

Birth and death rates in the railway population were 9 per mille and 5 per mille whilst the infantile mortality was as high as 231 per 1,000 live births. The Bhusaval infant welfare and maternity centre continued to do useful work.

First-aid equipment boxes at railway stations and in passenger trains were maintained in good order. Thirty classes in first-aid were held at 21 stations and 373 candidates were given training; of these 209 obtained certificates, four vouchers, one a medallion and one a label.

The Bengal and North Western Railway—It was reported that owing to the high levels of sub-soil water malaria and dysentery were both prevalent, several severe epidemics of malaria being recorded. Contractors' labourers at Bhikna Thoree were particularly affected and railway work almost ceased as a result of the epidemic. After a travelling dispensary was opened and free supplies of quinine were distributed, the daily number of cases dropped from 384 first to 15 and then to nil in about three weeks. The Principal Medical Officer suggested that, before the next malaria season starts, control by means of 'Pyrocide 20', which had been found very useful in Delhi, should be attempted.

Plague appeared in severe epidemic form in Gorakhpur town and district. About a thousand inoculations were carried out and, with the exception of a case in the railway quarters at Shahjanwa, the railway colony at Gorakhpur and out Stations remained unaffected.

A medical graduate for the combined duties of food inspector and health officer was appointed. In addition to the inspection of food supplies for sale at railway stations, he carried out epidemic duties when necessary. Nearly all running staffs were trained in first-aid. A woman doctor was appointed for maternity and child welfare work at Gorakhpur.

North Western Railway.—A total of 653,854 cases were treated in the hospitals and dispensaries; the days of certified sickness of employees totalled 403,765, whilst 220 employees were invalided from the service during the year. The chief diseases were cholera 64, dysentery 8,269, enteric fever 693, syphilis 239, gonococcal infections 177, influenza 5,336, malaria 118,566, plague 5, smallpox 280, tuberculosis of lung 397, other forms of tuberculosis 275, trachoma 13,431, cataract 93, and injuries 52,642. 307 cases of labour were conducted and 10,830 surgical operations were performed.

Motor ambulances were provided at Delhi, Karachi, Lahore and Rawalpindi. First-aid training was carried on under the suspices of the North Western Railway Centre of the St. John Ambulance Association. Five hundred and eighty-seven candidates were trained in first-aid, 12 in sanitation and one in home nursing. Of these 429 received first-aid certificates, 57 received vouchers, 13 received medallions, 39 received labels, 12 received sanitation certificates, one received a home nursing certificate and 7 received pendants.

Seven child welfare Centres and 3 sub-centres were at work under the auspices of the Child Welfare Association, at a cost of approximately Rs. 19,800.

A total of 9,289 home visits were paid to ante-natal cases and 43,364 visits to infants and toddlers. Of the 638 registered births, 495 confinements were supervised; maternal deaths totalled nine and infant deaths 19.

SECTION V.

MEDICAL INTELLIGENCE AND INTERNATIONAL HEALTH INCLUDING PORTS.

Epidemiological Intelligence.

57. Co-operation in the sphere of public health has been one of the most successful of international relationships during recent years. In this sphere, indeed, co-ordinated effort has become more and more essential because of the increased facilities for rapid transport and the consequent removal of the time-barrier in respect of the spread of disease from one country to another. Through the Office International d'Hygiene Publique, the Health Organisation of the League of Nations and the Pan-American Sanitary Bureau, the problems associated with prevention of the development and spread of disease have been approached from the standpoints of free interchange of medical intelligence, of organised studies of epidemiological and administrative questions and of direct help, both in material and personnel, to countries overtaken by widespread outbreaks of epidemics.

The active part which India has played in connection with the activities of the Office International d'Hygiene Publique and the Health Organisation of the League of Nations are the subject of remarks in succeeding paragraphs of this section. It will be obvious from those remarks that this country has given considerable assistance in different directions to both these international organisations and that India has herself profitted by her association with them.

As in previous years, the office of the Public Health Commissioner with the Government of India continued to function as the Epidemiological Bureau of the Government of India. Epidemiological information was issued as usual in a series of weekly and monthly statements and bulletins.

Office International d'Hygiene Publique, Paris.

58. Colonel Russell attended the May meeting as delegate for India. The most important business was as usual transacted by Commissions and the Indian delegate was a member of four of these, *viz.*, quarantine, aerial navigation, yellow fever and opium.

The Quarantine Commission made recommendations on various points referred to it in connection with bills of health, the extermination of rats on ships and notifications and declarations of outbreaks of infectious disease. Information was laid before the Commission that large numbers of rats sometimes are found on ships possessing a certificate of deratisation (or an exemption) in perfect order and not out of date. As regards the possibility of rapid re-infestation after deratisation or after the pronouncement of exemption, the Commission was of the opinion that it was only in exceptionally serious cases that a ship should be deratised before the expiry of the regulation six months' period. In order to sum up easily the condition of a ship inspected for the presence of rats the Quarantine Authorities of the U. S. A. Public Health

Abbreviations :—I.S.C.—International Sanitary Convention.
P.H.O.—Port Health Officer.

Service use a diagram, copies of which have been sent in to the Committee. On this diagram are shown the places in a ship where rats may possibly be harboured. For each ship the inspecting officer notes down the degree of infestation of each one of these compartments. The diagram is filled in and conserved by the authorities so that a sort of ' dossier ' is built up from the point of view of the murine population of the ships frequenting the port. This dossier permits of interesting comparisons regarding the ports from which the vessels have come, the nature of the certificates held, etc. Moreover, the diagram aids in the inspection, serves as the basis for the issue or refusal of a certificate of exemption and if fumigation is decided on then gives useful information regarding how the operation is to be carried out. The Commission deferred examination of this question to a future meeting.

The delegate for India put the following three questions :—

(*i*) Should a port declare itself infected, in accordance with international regulations, if a case of plague or cholera is found there ?

(*ii*) When should notifications be sent that there is an epidemic of smallpox or typhus ?

(*iii*) Are measures to be applied in a port, which is itself free from the disease, to persons coming from districts where an epidemic of cholera has been declared ?

In reply to these the Commission summed up the position as follows :—

(*i*) " The Commission does not think that such a declaration is necessary. The 1926 Convention requires the notification of a first case of plague or of cholera, followed by complementary information. The Government of the country in which the case in question has been found is responsible for making only these declarations. It is the responsibility of other countries, having considered the information sent them regarding this point, to say whether the locality is infected or not."

(*ii*) " This question has been asked previously and the problem varies with different countries and conditions. If it is a country in which the disease does not usually exist then there is no need to declare the appearance of sporadic individual cases. But it does not seem possible to decide, in accordance with a uniform rule, the number of cases necessary to constitute an epidemic. The appreciation of the situation should take into account local conditions. Generally speaking an epidemic exists when there are several cases resulting one from another. For countries in which the diseases are endemic, statistics regarding cases of typhus and smallpox are brought to the knowledge of other countries by the periodic epidemiologic bulletin. A special notification should be sent when the number of cases reaches an unusually high level, if this will necessitate the application of stricter preventive measures."

(*iii*) " The Convention of 1926 contains no provisions with regard to this problem. It is a principle of international maritime prophylaxis that only the state of sanitation of the vessel and of the port of embarkation shall be taken into account. Article 13 of the Convention forbids the embarkation of persons who are ill or of those persons in the same party who are in such a condition as to be able to transmit the disease ; it does not recommend that enquiries should be made as to whether persons arriving from the hinterland at the port of embarkation have been exposed to infection in the district from which they come."

The Aerial Navigation Commission discussed the system of notifications relating to aerodromes, sanitary taxes, the revision of the *carnet de route*, and the dangers to health arising from the despatch by airmail of certain goods. As regards the system of notifications relating to aerodromes, the Commission pressed for notification direct to the " Office International " of cases of infectious diseases (particularly yellow fever) in the case of countries which had not yet been doing so. Discussion on the last subject was postponed to a later meeting.

The Yellow Fever Commission drew attention particularly to the new information placed before it concerning the endemic existence, in South America, of a form of yellow fever in the absence of *Aedes aegypti* and sometimes of human beings. It also discussed the discovery, in Africa, of clinical forms of yellow fever in which nervous symptoms predominate. In regard to the resolutions on the subject of yellow fever passed by the Pan-African Conference in 1935 at Johannesburg (pages 101-102 of the Public Health Commissioner's Report for 1935), the Commission made the following observations :—

"With reference to Resolution 3 recommending the introduction of laboratories in endemic zones, the committee would like to point out that this recommendation has already been given practical effect by appointing specialised personnel in district laboratories at Accra, Freetown, Lagos, Dakar, Brazzanaville, Leopoldville and Khartoum. The introduction of new services in these laboratories is being considered in the French Sudan and in the Cameroons. As a result of negotiations, already well advanced, between the London Colonial Office and the Rockefeller Foundation it has been decided to set up an Institute for research in yellow fever at Entebbe in Uganda. This institution will be provided with equipment and personnel which will permit of a wide study of the problems included in Resolutions Nos. 1, 2 and 4 of the Pan-African Conference including the problem of finding out whether yellow fever in the absence of *Aedes aegypti* exists in Africa and if, in Africa, man is the sole source and reservoir of infection."

"The Committee supports the principle contained in Resolution 6. It proposes that reports should be sent annually by the different African countries to the International Office of Public Hygiene informing the 'Office,' of the *Aedes aegypti* index in the principal centres situated in endemic regions and in localities where aerodromes are now established or are likely to be in the near future."

"With reference to Resolution No. 9 recommending that the personnel of planes flying in the endemic regions should be protected by anti-amaryl vaccination, the Committee has been informed that the whole of the flying personnel as well as the European personnel of the aerodrome services on the air route between Khartoum and Kano is vaccinated."

In regard to viscerotomy and histopathological examination of the liver the Commission recommended that those specialists who are trained in the microscopic examination of sections of malaria liver should send to each other the mounted slides concerning which doubt exists ; it also recommended that these specialists should exchange ideas.

The Commission again expressed the opinion that yellow fever prophylaxis rests on the reduction of the *Aedes aegypti* index and its maintenance at as low a level as possible. It also considered it important to continue experiments for the destruction of mosquitoes in aeroplanes in order to ascertain the efficacy of different methods and different fumigants and insecticides. The recommendation was made that an investigation should be carried out in respect of adaptation of the design of planes with a view either to prevent mosquitoes from entering or prevent them finding refuge in places where they might be immune from anti-mosquito measures. As regards vaccination, the Commission thought that the experiments now in progress should be followed with great attention, as this method appeared to reduce to a minimum the danger of accidents. The Commission further remarked :—

"The Committee is of the opinion that, at the moment, vaccination is to be recommended for all persons who run the risk of contracting yellow fever by reason of their permanent or temporary stay in a region where yellow fever is existent, but it thinks that preventive vaccination in mass is not to be recommended at the moment whatever may be the method employed, and that the greatest care is to be advised regarding the use of neurotrope virus from the mouse especially when it is employed without the addition of anti-toxic serum."

(B) At the October meeting Major General Sir John Megaw attended as delegate for India.

Among other subjects, the Quarantine Commission discussed the question of deratisation exemption certificates issued by ports not qualified to do so. It was agreed that there might be exceptional cases in which the personnel would be competent to issue such certificates, although they had no provision for deratisation of vessels. It was also agreed to request the Governments concerned to refrain from declaring ports as qualified for granting exemption certificates unless they were also qualified for deratisation.

The communications from India submitted during this session included (*i*) a note by Lt.-Col. J. A. Sinton and Major R. C. Wats on the efficacy of various insecticidal sprays in the destruction of adult mosquitoes ; (*ii*) a note by Dr. E. P. Hicks and Subedar Diwan Chand on the transport and control of *Aedes aegypti* in aeroplanes ; (*iii*) a note by Lt.-Col. S. S. Sokhey and Dr. H. Maurice on the relative protective powers of anti-plague vaccine by a virulent culture and by cultures killed by heat ; and (*iv*) a note on destruction of locusts from the Imperial Council of Agricultural Research.

The perennial problem of the refusal by certain port health authorities to accept valid deratisation or exemption certificates was also discussed. Some port health officers persisted in demanding fresh fumigation of ships despite their possession of proper certificates of deratisation or exemption. It was agreed that the attention of offending ports should be called to the recognised procedure. It was also agreed that certificates of deratisation should not be granted in cases in which only partial deratisation was carried out.

The Aerial Navigation Commission in considering the interpretation of Article 42* of the I. S. C. for Aerial Navigation, 1933 agreed that the sanitary authorities of the aerodromes or of the region in which the aerodromes were situated must decide for themselves, after taking all the circumstances into consideration, as to the necessity for medical examination of passengers and crew. There was some discussion regarding the use of sprays for disinsectisation of aeroplanes. It was suggested that certain pilots were susceptible to the action of pyrethrum and that the substance sometimes gave rise to attacks of giddiness, but the general opinion seemed to be that the fumes of pyrethrum would disappear very quickly and that no serious inconvenience would be likely to arise.

The question of the period of quarantine against yellow fever was raised. In this connection delegate for India made the following remarks :—

" On the one hand, it was at first hoped that no aircraft would make the journey from Kisumu to Karachi without change of machine or crew. Nevertheless, according to reports from the Director of the Regional Bureau of the Quarantine Board at Alexandria, journeys are now being made from Africa to India without change of aeroplane and passengers and crew can arrive from Africa within the incubation period.

On the other hand, the Government of India has adopted plans for buildings and equipment at the airport of Karachi taking into account the provisions of the Convention of 1933 and the urgent necessity of protecting India against the importation of yellow fever. The arrangements are already well advanced, but it is not expected that the airport of Karachi will be completely equipped for the reception of cases of yellow fever or contacts and for the disinsectisation of aircraft in the immediate future.

Immediate action however, was necessary in view of the direct flights from Africa to Karachi, hence the regulations made in September.

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*This article provides for measures in regard to persons in whose case it has been duly established that they have been exposed to the infection of yellow fever.

As regards the period of prohibition of 9 days, it is explained as follows : Following the period of incubation a patient is infective for the first three days of the disease ; the necessity for a period of 9 days results from recent observations according to which there is a benign type of yellow fever in which the symptoms may resemble those of a slight attack of influenza. If such cases occurred at the end of the incubation period they might not be recognised at the time of the medical examination on arrival in India and so escape isolation. There are also observations showing that it might not be absolutely safe to regard a period of incubation of 6 days as the minimum in all cases. "

The delegate for India supplemented these remarks later in the plenary session in order to dispel the impression that the Government of India were adopting an unreasonable attitude. The substance of these remarks is given below.

" Perhaps you wonder why a delegate from India comes every six months to tell the same tale of the danger of importing yellow fever into the tropical East. In other respects the Indian delegates are good boys who co-operate very amicably, and it is only in connection with this " Affaire Jaune " that they are obstinate, perhaps you will even say—" backward " children. It is not pleasant for the representatives of India to listen to the reproaches of our colleagues with whom we are otherwise in full accord and whose indulgence is so much appreciated by us. Why do we not accept the assurances of your *savants* ? Why are we not persuaded by the hypnotizing eloquence of your orators ? It may be that we are in the wrong, but on the other hand it may be that there is a misunderstanding due to our failure to make you appreciate our point of view. When I was the Indian delegate in April 1932, you made a very important concession by inserting in the proceedings the following words :—

" In order that in future there may be no misunderstanding with regard to the meaning of Article 48 of the Convention, the Committee has decided to ask that the following should be inserted in the Proceedings of the Session.—" In the opinion of the Committee it will be for the country of arrival to judge whether or not the circumstances justify the country in exercising the right of forbidding the entry of aeroplanes into its territory. This refers to the right reserved by the terms of the said Article 48. It follows that a country which may decide to forbid the entry of aeroplanes would have to communicate to the Office International d'Hygiene Publique the reason for its decision."

" I have already told you what action the Government of India has just taken ; the notification which it has issued is in complete accord with the Air Navigation Convention save in the matter of the length of incubation of yellow fever. There is a good deal of evidence that this period may exceed 6 days and even if it did not the period of infectivity (for mosquitoes) of the patient during the first three days of his illness has to be taken into account. Even if it were admitted that it would be easy to make a provisional diagnosis of yellow fever at the onset of the disease, *provided suspicion were aroused* and so to take the necessary precautions, it is none the less possible that the patient might readily escape the notice of the sanitary personnel of the aerodrome, especially if the disease were of a mild form. Also we have no right to declare that mild forms of the disease are never infective for mosquitoes. Some *savants* tell us that the period of incubation of yellow fever never exceeds 6 days ; they tell us that we must trust in their judgment, but other experts who have made a thorough study of the question tell us that it is not safe to accept 6 days as a maximum period in all cases. It follows that we have not yet attained to the certainty which is essential in a question of such gravity as the importation of yellow fever into the Far East.

I must add that the precautions which the Government of India has felt obliged to take will cease to interfere in any way with air traffic from the moment when all the aerodromes of infected and suspected countries have been made thoroughly " anti-amaryl ". I insist that the general situation of India and the tropical East constitutes a " circumstance " altogether " exceptional " and that the Government of India would fall short of its duty towards the *Office International* and the whole world if it did not place every possible obstacle in the way of the importation of the virus of yellow fever into India."

The Commission noted these circumstances but expressed the hope that on the conversion of Karachi into an anti-amaryl aerodrome these circumstances might be reconsidered. Furthermore, it would observe that the period of nine days is greater than that (six days) laid down in the International Sanitary Convention for Aerial Navigation which was considered sufficient to cover all.

the possibilities of risk. The Commission nevertheless, did not consider itself competent to give a ruling on the scientific aspects of this question and referred the matter to the Yellow Fever Commission for examination.

The Yellow Fever Commission considered (*i*) the information received regarding yellow fever cases reported during the six months ending 30th September :—Bolivia 16, Brazil (seven States) 181 and Columbia 51 in South America ; French Colonies 13 and British Colonies 7 in Africa ; (*ii*) the question of mouse protection tests ; and (*iii*) the subject of vaccination against yellow fever. Regarding (*ii*) and (*iii*) the Commission reported as follows :—

"In the mouse-protection tests carried out with the co-operation of the Rockefeller Foundation in the Islands of the Caribbean Sea and in the different countries of Central America, it was found that the results of the tests agreed in general with the epidemiological facts already known. In Cuba, the youngest person whose test was positive was born in 1908. In Mexico, the last cases of yellow fever were reported in 1921, whilst 2 of the youngest donors were born in 1924 and 1 in 1925 ; the yellow fever infection would therefore seem to have lasted a little longer than appeared from the known cases. In Salvador, the youngest positive subject was born in 1925, one year after the last known case in that country.

In the Anglo-Egyptian Sudan, in the region of the Nuba Mountains, situated north-east of the Province of Bahr-el-Ghazal, positive protection tests were found in several districts (Eliri, Lafufa, Nyaro, Kau, Haiban and Gulfan). The proportion was high in some of these districts, reaching 78 per cent. in the Kau district. It was not possible to establish any connection between these positive tests and the presence in the past of a disease clinically resembling yellow fever. The position is the same as that reported previously in various regions of Equatorial Africa (Upper Ubangi) where very high percentages of positive tests, up to 97 per cent. have sometimes been found.

In the Belgian Congo, new information relating to the protection test was obtained. In the Lower Congo, the serum of persons who gave negative results at the examinations carried out in 1932 and 1933 was re-examined ; in 6 per cent of these persons the serum had become positive. No disease resembling yellow fever had occurred in the meantime, as far as is known, either in these persons or in the region. But all the persons whose serum had become positive lived in the same or in neighbouring huts. In the Libenge region, near Ubangi, an epidemic of infectious jaundice occurred. In 1933, the percentage of positive tests in this region was 6 (adults 12, children 0) ; after the epidemic, 29 per cent of positive tests were found among natives who stated that they had not had jaundice, and 46 per cent among persons who had recovered from jaundice. Up to the present the disease has not been identified with yellow fever.

These findings show that it would be advisable to repeat the examination by means of the protection test, at an interval of several years, especially in regions in which the test gave only a small percentage of positive results, and especially if possible in persons who were negative at the first examination. It would also be interesting to confirm whether persons, whose protection test was positive at a first examination still gave a positive result at the end of several years.

The pantropic yellow fever virus attenuated by culture on tissue has now been used, combined with immune serum, on 380 persons in London, 35 in New York and 500 in Rio de Janerio. No reaction worth mentioning was observed which could be attributed to the virus.

Doctors Sawyer and Baver of the Laboratories of the International Health Division of the Rockefeller Foundation, New York, have succeeded in preparing a hyper-immune serum from the Rhesus monkey of which the average activity is equal to 20 times, and in some cases to 60 and 80 times, that of the usual activity of human sera. Of 535 persons on whom this serum was used, only one showed a severe serum reaction. The use of such a serum would enable a much smaller dose to be injected in vaccinations with virus and immune serum.

The immunity produced by vaccination does not last so long as that which follows an attack of yellow fever. It would be advisable to make a re-examination, two or three years after vaccination, of the condition of immunity and, if this is very weak or absent, to revaccinate."

The Pilgrim Commission dealt mainly with the necessity of quarantine measures at the frontiers of Saudi Arabia, particularly the northern frontier where the Syrians entered from Damascus without inoculation. It was stated that numerous pilgrims had made the pilgrimage and returned to their homes without being subjected to any sanitary control. Similar difficulties experienced in the control of the eastern route *via* Najaf were also mentioned. The Iraq representative gave the assurance that his Health Department would in future disinfect the belongings of these pilgrims, and stated that proper examination of the pilgrims was already being carried out. The Commission expressed the opinion that the sanitary authority of each country through which the pilgrims travelled by motor car should take suitable steps at the frontier for sanitary control both on the arrival and departure of pilgrims and also recommended that pilgrims should only be allowed to use authorised and controlled routes.

Other subjects discussed during the meeting were psittacosis, plague, rheumatism, cerebrospinal meningitis, destruction of locusts, smallpox, bovine tuberculosis, poliomyelitis, ankylostomiasis and mental hygiene.

Singapore Bureau, League of Nations.

59. The ninth meeting of the Advisory Council was held at Singapore from the 15th to 17th January, 1936, and was attended by delegates from Australia, British Colonies and Dependencies, China, India, Indo-China, Japan, Japanese Colonies, Netherlands Indies, Siam, Hongkong and Philippine Islands. The Council passed the following resolutions among others :—

4. The Advisory Council, having considered the note submitted on the Medical Organisation of the Eastern Bureau dealing with the general principles which are to govern the appointments to the Medical Staff, *recommends* by a majority vote, (the members representing Japan and Japanese Colonies dissenting), that both posts of Deputy Director be filled in rotation by Medical Officers belonging to countries participating in the activities of the Bureau.

5. The Advisory Council, having considered the report on the second International Pacific Health Conference held at Sydney, *notes* with pleasure the willingness of the Pacific Health Administrations to collaborate with the Eastern Bureau both through the centre at Canberra and directly.

6. The Advisory Council, having considered the report of the second International Course in Malariology held in the East, *expresses* its gratitude to all those who have assisted at the Course and particularly wishes to thank the Governments of Straits Settlements and Netherlands Indies for their collaboration.

7. The representatives of Health Authorities present at the meeting of the Advisory Council having been informed of the preparatory arrangements which are being made in connection with the Conference on Rural Hygiene in the Far East, *undertake* to give all possible assistance to the Members of the Reporting Group who may visit their countries.

8. The Advisory Council, realising the serious danger to other Eastern countries should yellow fever spread to India, and being of opinion that every possible precaution should be taken to prevent such a spread, and that " silent areas " constitute a grave risk, notes with satisfaction the position adopted by the Permanent Committee of the Office Internationale d' Hygiene Publique regarding the measures that should be taken in all suspected regions in Africa to discover at the earliest possible moment those in which the disease actually exists.

9. The Advisory Council *recommends* that the Bureau should communicate with the Alexandria Bureau with a view to arriving at a mutually satisfactory arrangement regarding the transmission of information between the two Bureaux.

10. The Advisory Council *asks* the Bureau to investigate and report on the practice in Eastern countries regarding the question of determining when infection in a port can be said to have ceased, in order to ascertain what degree of uniformity may be obtained.

The Health Committee of the League of Nations, Geneva, at its meeting in April, 1936, passed the following resolution :—

"The Health Committee takes note of the resolutions adopted by the Advisory Council (Document C. H. 1206);

Expresses its appreciation of the decisions taken by the national health administrations in the East to facilitate the work of the Preparatory Commission for the Rural Hygiene Conference in the Far East;

Draws the attention of the Secretary-General to resolution No. 4 of the Advisory Council and transmits to him an account of the discussions of its Far Eastern Committee relative thereto.

It again emphasises the fact to which it called attention at its 22nd session that the Health Organisation is compelled to meet the large deficit left in the budget of the Bureau after receipt of the contributions of certain Eastern countries which are most particularly interested in its operation; in consequence, it earnestly requests the Council to invite those countries which do not yet do so to make a yearly contribution towards the expenses of the Bureau, or should they already contribute, to consider the possibility of raising the amount of their contribution."

During the seventeenth session of the Assembly of the League, a number of delegates, including one from India, made a reference to the value of the work of the Eastern Bureau.

Epidemiological Intelligence.—The Eastern Bureau continued to receive from Eastern Governments epidemiological notifications required under the I. S. C., 1926, and to forward them immediately to Paris and to health authorities of countries in the Eastern Arena.

The weekly wireless message continued to be transmitted from Saigon on shortwave. The transmission from Malabar was, as before, a very important item in this service in as much as no trouble was experienced anywhere in receiving this message. In addition, the daily wireless service from Malabar enabled immediate transmission of urgent news. Acting on the resolution passed by the Advisory Council in January, 1936, the Director entered into an arrangement with the President, Sanitary Maritime and Quarantine Board of Egypt, Alexandria, for the transmission of information to the latter, who, in addition to the full relayed information from Geneva, now receives direct information from the Eastern Bureau of the League regarding the occurrence of first outbreaks of infectious diseases in ports on the western seaboard of India, Persian Gulf and the East Coast of Africa. An arrangement also exists between the Government of India and the Eastern Bureau by which the Alexandria Bureau will be advised directly in regard to infected vessels leaving a port of India for Europe. The weekly Fasciculus issued by the Bureau included epidemiological data from 45 countries. The list of ports of eastern countries qualified to carry out deratisation of ships and to issue certificates of exemption from deratisation in accordance with the I. S. C., 1926, was maintained up-to-date.

Quarantine restrictions.—Special measures regarding plague taken by Ceylon were notified as follows :—

" With a view to preventing the introduction of plague into Ceylon, all cargoes of rice, paddy and cotton in bales arriving in Colombo harbour from plague-infected ports are being subjected to fumigation with hydrocyanic acid gas with effect from 1st September 1936. The fumigation is carried out in lighters into which the cargoes have been loaded.

Fumigation is also insisted in the case of the following articles stowed in the same compartment as a cargo of raw cotton, cotton waste, rice or paddy from a port infected with plague :—

Rice or other grain (exclusive of flour), oilcake in sacks, beans in mats or sacks, matting in bundles, dried vegetables in baskets or cases, dried or salted fish, peannuts in sacks, dry ginger, copra, loose hemp in bundles, coiled rope in sacking, kapok, maize in bags, sea grass in bales bamboo poles in bundles, bran, pollard, chaff in bags and hides."

Aerial Navigation.—With regard to airports on the main lines to the East and also with regard to aerodromes in the interior of India, the Alexandria Bureau communicates with the Paris Office directly. The Eastern Bureau at Singapore, however, transmits restrictions placed by certain countries on travellers from infected areas directly to Alexandria at the request of the Paris Office.

Disease incidence in Ports.—Four of the seven plague infected ports were in British India, *viz.*, Bassein 37 cases, Rangoon 15, Karachi 6 and Bombay 2. As regards cholera, Calcutta with 4,157 cases was the most heavily infected port throughout the East ; Bangkok had 580 cases ; Madras 387 and Negapatam 161 ; in other ports the incidence was low or sporadic. Smallpox continued to be widely prevalent in Eastern ports, Calcutta reporting 6,037 cases, Bombay 1,375, Shanghai 361, Moulmein 304, Nanking 275, Chittagong 186, Karachi 168 and Vizagapatam 109 ; elsewhere low or sporadic prevalence of the disease was recorded.

Pilgrim traffic.—The Hedjaz pilgrimage was declared free from plague and cholera by the Sanitary Maritime and Quarantine Board of Egypt.

Liaison work.—This was continued by the distribution of literature, etc.

Malaria Course.—The third international course in malariology was held during the period, April to June and was attended by 18 doctors from 9 countries, including two from India.

League of Nations Health Organisation, Geneva.

60. During the year, the Health Organisation devoted particular attention to the problems of nutrition, housing and physical training.

In regard to nutrition, the Health Committee of the League's Health Organisation, since 1926, has organised exchanges of scientists, published technical studies on dietary systems, held conferences of experts and finally issued a general report entitled " Nutrition and Public Health ". Another report " The Physiological Bases of Nutrition ", provided accurate data in regard to the nutritional policy pursued or contemplated in certain countries and included a series of principles for adoption.

As regards housing a Commission was appointed to examine the preliminary documentary material collected from different countries and to draw up a plan of technical studies. The aim was to place at the disposal of administrations and legislatures any documentary material they might desire to obtain on the principles of modern hygiene in the field of urban and rural housing.

In the sphere of physical education, the Health Organisation was still in the exploratory stage, but it was proposed to publish a report on " Physique and Health " based on studies in several European countries.

In order to prepare for the Intergovernmental Conference on Rural Hygiene to be held in the East in 1937, the Health Committee set up a Commission to carry out a study tour in India, Burma, Siam, Malaya, French Indo-China, the Philippines, the Netherlands Indies and Ceylon.

The service of epidemiological intelligence continued to work successfully.

Up to 1935 the permanent Commission on Biological Standardisation of the League had established international standards for eleven therapeutic sera, one bacterial extract, four vitamins, three sex hormones, five gland preparations and five other therapeutic agents. Thirty-one countries have officially recognised and adopted these units and standards—19 in Europe, 7 in America, 1 in Africa and 3 in Asia and Australia.

The League Health Committee held its twenty-third session at Geneva from 29th April to 2nd May and reviewed the activities of the Health Organisation. Colonel A. J. H. Russell attended. The subjects discussed included (*i*) the progress of inquiries into urban and rural housing; (*ii*) the Conference on Rural Hygiene in the Far East, the venue of the Conference, the preparatory work in regard to the problems suitable for treatment by the Conference and the documents to be laid before it; (*iii*) nutrition. The Committee decided to consult experts regarding the methods of estimating the state of nutrition, particularly in children and nutritional needs during infancy. The extension of the investigation to continents other than Europe and North America (nutrition of Asiatic and African peoples) was also considered. In Asia, the question would figure on the agenda of the Rural Hygiene Conference and of the Far Eastern Association of Tropical Medicine to be held in 1938.

A discussion on liasion with Health Administrations brought out the value of collective study tours as a means of establishing contact between national administrations and institutions and of developing a reciprocal acquaintance with methods of solving the main problems that arise in public health and social medicine. The Health Committee welcomed a proposal for the arrangement of a study tour by six distinguished health specialists of Latin-America, of modern institutions in the United States and the chief countries of Europe, responsible for the training of health personnel. Discussions were also held on the reports of the Pan-African conference and the Eastern Bureau at Singapore and the question of revision of the International Nomenclature of Diseases, aiming at ensuring comparability of the mortality statistics of different countries.

The Committee also considered the report of the Director of the Health Section and dealt with the Health Organisation's work on syphilis. It also took several decisions regarding proposals made for investigations into maternal mortality, lupus and drug addiction.

Indian delegation to the 17th (Ordinary) Session of the Assembly of the League of Nations held from the 21st September to 10th October 1936.

61. The Indian Delegation consisted of His Highness the Right Honourable the Aga Khan, G.C.S.I., G.C.I.E., G.C.V.O., Leader, Sir Denys Bray, K.C.S.I., K.C.I.E., C.B.E. (Member of the Council of India); and Sir V. T. Krishnama Chari, K.C.I.E. (Diwan of Baroda). Mr. Charu Chandra Biswas, C.I.E., acted as substitute delegate.

The delegation reported on the Second Committee as follows :—

The manifold activities of the League Health Organisation are admirably summarised in the comprehensive report which the rapporteur, on behalf of the Second Committee, presented to the Assembly; those aspects of the work which especially concern India were dealt with by Sir Krishnama Chari in his speech reproduced below. Several tributes were paid to the epidemiological work of the Eastern Bureau at Singapore which, in the words of the Netherlands delegate, is not only a centre of information, but an observation post fulfilling a preventive function of the greatest importance. Appreciation was also expressed of the international malariology courses for the Far East, which have been held every year since 1934; these consist of lectures by distinguished malariologists, theoretical and laboratory studies, and field work. Scholarships are granted to medical officers nominated by Governments.

Following the European Conference on Rural Hygiene, which met at Geneva in 1931, the delegates of India and China at the 1932 Assembly asked that a similar conference should be convened in the East. This request was repeated at each subsequent Assembly until in October 1935 the Health Committee of the League decided that such a conference should take place in August 1937; by the invitation of the Government of Netherlands East Indies, it will be held in Java. Meanwhile the League appointed a Preparatory Commission of three members, who visited the eastern countries, including India, during 1936.

On its return the Commission proposed an agenda covering not only medical assistance and public health in rural districts, but other kindred questions, such as the collaboration of the public, sanitation, nutrition and finance. In the Second Committee the delegates of the Netherlands, China and France, on behalf of the Governments of the Netherlands East Indies, China and Indo-China, welcomed the Conference. In particular, it was pointed out that the wide scope of the Conference made it very desirable that the delegations appointed by the various countries should include not only medical officers of health experts, but also representatives of the other competent services, such as those dealing with agriculture and education.

Sir Krishnama Chari congratulated the Rapporteur on his excellent summary of the work of the Health Organisation. India was deeply interested in this work, with which it had been associated continuously since 1926. In recent years keen interest had been taken in health problems in India, it was recognised that co-operation and the maximum degree of continued and co-ordinated effort between the Central and Provincial Governments was essential, and active steps were being taken to establish a Central Public Health Advisory Board for the entire country.

He would first refer to some aspects of the Health Organisation with which India was specially concerned and then touch on the important question of rural hygiene.

India regularly supplied to the Eastern Bureau information relating to the health situation in the Indian sea-ports and provinces. In addition the two wireless stations of Madras and Karachi retransmitted the epidemiological messages broadcast by the Bureau.

The work of the Malaria Commission was of very special importance for India. Since 1929 the Malaria Survey of India had been intimately associated with that Commission. He need not refer to the work done by Colonel Sinton, with which the Committee was familiar. In India international malarial courses were held twice a year at the Ross Institute in the Punjab, while the Government also co-operated in the malarial courses for the Far East held under the auspices of the League.

The Pan-African Health Conference held at Johannesburg had been attended by Major General Sir Cuthbert Sprawson as an observer on behalf of the Government of India. That Government was seriously apprehensive of the danger of entry by aeroplane through the airport of Karachi, from Africa, of persons or mosquitoes infected with yellow fever. This apprehension was chiefly felt in respect of the large Indian population which was non-immune to yellow fever; but another important aspect was that, from the point of view of air traffic, India was the gateway of the further East and the countries beyond India were therefore also interested in the protection of India. The Government was appointing a special health staff at the airport of Karachi as distinct from the seaport. But this one barrier was insufficient, and India earnestly hoped that the measures for ensuring protection against yellow fever recommended to the Conference by the Indian observer would be put into effect.

As regards biological standardisation, the Conference on this subject had recommended that each country should have a national centre or centres, to serve as a recognised scientific authority in this field. The Government of India had accordingly established the following centres to advise on international standards:

(1) Nutritional laboratories at Coonoor for vitamin standards.

(2) Colonel Chopra's laboratories at the Calcutta School of Medicine for hormones and drug standards.

The Government was further considering the formation of a central laboratory for the control and standardisation of drugs.

A subject in which India had shown the keenest interest since 1932 was that of rural hygiene in the East. It was therefore very gratifying to learn that a preparatory commission had studied conditions in the Far East with a view to preparing a useful programme of work for the Conference to be held in Java. Liberal grants had been made by the Central Government to the Provinces for the purpose of studying this problem, so that the proposed Conference at Java came at a most opportune time.

A problem which presented very different features in East and West was housing and, more particularly, rural housing. The studies now in progress in this field should be supplemented by special studies of Eastern countries, where conditions were widely different".

Nutrition.—" The Health Organisation of the League has been engaged for some years in the study of the problem of nutrition in general and also with special reference to the safeguarding of public health in periods of economic depression. At the Assembly of 1935 the problem was placed in the forefront of the Second Committee's discussions. The marked interest which the Assembly showed in the subject was due, in the first place, to a

realisation of the possibilities of great improvements in public health through better nutrition ; but while these factors were undoubtedly uppermost in the minds of delegates the interest displayed was also due to the fact that, through improved nutrition, it should be possible to contribute, first, towards a solution of national and international agricultural problems and, scondly, towards an improvement in the world economic situation. A resolution adopted by the Assembly provided for the continuation and extension of the work of the League Health Organisation on nutrition in relation to public health ; for the collection by the League of information on the measures taken in all countries for securing improved nutrition ; and for the appointment of a Mixed Committee, including agricultural, economic and health experts to submit a report on the whole question in its health and economic aspects to the Assembly in 1936.

At this year's session the Second Committee had before it the interim report of the Mixed Committee, a report by a Technical Commission of the Health Committee on the physiological bases of nutrition, a study on nutrition in various countries by the League Secretariat, statistics of food production, consumption and prices compiled by the international institute of Agriculture, and a report by the International Labour Office on "Workers' Nutrition and Social Policy ". Of the considerable number of delegates who took part in the discussion, nearly all spoke with appreciation of the value of these reports, especially that of the Mixed Committee ; most speakers also gave accounts of the work on nutrition undertaken in their own countries. The Australian and Netherland delegates drew particular attention to the importance of investigating the relationship between nutritional policy and agricultural policy.

The Committee also heard an interesting statement by Viscount Astor, Chairman of the Mixed Committee on Nutrition. He explained the objectives which had so far guided the Committee's work, and pointed out that it had not yet been possible to examine fully all the aspects of the problem. He drew attention to the fact that, while the Mixed Committee could do no more than bring facts and suggestions to the notice of Governments, they were fortified in doing so by the remarkable unanimity which characterised the conclusions of the experts as to adequate standards of nutrition.

The Second Committee adopted three resolutions. The first embodied taxtually the preliminary recommendations of the Mixed Committee. Governments were asked to encourage and support the scientific study of nutrition problems, as well as the dissemination, by education and propaganda, of the information collected as the result of such study, and to support the efforts of the League Health Organisation and other international bodies in the same field. They were further recommended to consider how best to meet the nutritional needs of the poorer sections of the community, especially expectant and nursing mothers, infants, children, adolescents and the unemployed ; to take steps to improve and cheapen the supply, marketing and distribution of foodstuffs ; to promote the international standardisation of the technical analysis and control of foodstuffs, and to set up standards of reference and specifications for grading foods of all kinds according to quality; to consider whether any modification of their general economic and commercial policy is desirable in order to ensure adequate supplies of foodstuffs ; to collect information and statistics on various aspects of the nutrition problem, and to set up a central authority to co-ordinate the work on nutrition undertaken by various bodies in the country. Lastly, the resolution recommended the Governments concerned to give their full support to the Health Organisation in its enquiries into the widespread malnutrition which exists in the tropics and certain Far Eastern countries.

The second resolution recommended the re-appointment of the Mixed Committee for one year, in order that it might pursue its enquiries, especially into the economic aspect of the problem, with a view to submitting a final report to the next Assembly. The third resolution which resulted from a proposal made by Lord Astor, suggested that the Council, after consultation with the Chairman of the Mixed Committee, should arrange, if occasion offered, for exchanges of views among representatives of the national Nutrition Committee in the various countries.

The discussion gave Sir Krishnama Chari an opportunity of referring to the keen interest taken by India in the problem of nutrition. He quoted the Governor-General who, speaking in the Legislative Assembly, had said : " The problem of nutrition is at all times one of vital concern to any country, and on its solution hinges essentially the future of India as a whole ". Problems of human nutrition were being investigated by Dr. Aykroyd, Director of the Nutrition Research Laboratory at Coonoor. Data had been collected from investigations in that Laboratory on deficiency disease, vitamin standards and analysis of foodstuffs. A section of bio-chemistry and nutrition had been opened at the All-India Institute of Hygiene and Public Health at Calcutta, where several aspects of the problem were being tackled, in co-ordination with the Coonoor Laboratory, by Dr. Ellis C. Wilson, Professor of Nutrition and Bio-chemistry. Preliminary tables of the

nutritive values of about 200 common Indian foodstuffs were at present being prepared by Dr. Aykroyd and would be published on completion. A Nutrition Advisory Committee of the Indian Research Fund Association had recently been set up and had examined the investigations in progress and made various proposals for new work. The most important of these were recommendations for a survey of the state of nutrition in relation to dietary habits throughout India, for a survey of food production in India and for liaison between human nutrition work and crop production.

This was merely the beginning of a series of investigations, which were to be continued for a number of years. The Government had read with interest the reports by the League committees engaged in this work and would be glad to assist with any special research work in its laboratories.

There was one point which he would like to stress. The work carried out in Europe could not be applied to Eastern countries without making allowance for differences in climate, physique, economic conditions and social and other customs. Consequently, there were distinct features of the problem to be investigated in India. He was therefore glad that the subject of nutrition had been included in the agenda of the Conference on Rural Hygiene in the Far East."

The following extracts from the Report of the Fifth Committee which dealt with the questions of Child Welfare, Opium and the International Relief Union are also of interest :—

" In connection with its forthcoming reorganisation to form part of the new Advisory Committee on Social Questions, the Child Welfare Committee at its session held earlier in the year, had considered its future programme of work and had decided to place this question on the agenda of its next session. The future activities of the Social Questions Committees in the field of child welfare therefore took a prominent place in the discussions of the Fifth Committee. It was generally recognised that since the Assembly in 1935 and the Advisory Commission in 1936 had both expressed the opinion that the chief concern of the Committee on Social Questions should be the normal child, that Committee would have to direct its attention more particularly to preventive action. Among the subjects proposed for study by the new Committee were the extension of child welfare work to populations living elsewhere than in large towns, the nutrition of children and mothers, and the general organisation of child welfare, comparing the methods adopted and the results obtained in various countries. These proposals were embodied in the resolution which the Committee presented to the Assembly.

Sir Krishnama Chari said that the increased interest shown in recent years in child welfare had been very marked in India. A wide network of maternity and child welfare centres covering even small communities and extending into rural areas, was now in operation, while a number of legislative measures dealing with child welfare had been taken in the last few years. Laws affecting the age of marriage and of consent had been passed, and authorities had been empowered, both in British India and in a number of Indian States, to deal with neglected and ill-treated children. Young offenders were ordinarily sent to special schools or reformatories, where children's aid societies and Borstal associations helped the Government to re-educate them.

Women in India were increasingly alive to the problem of child welfare, and the new constitution, which gave the vote to millions of women and enabled them to take part in public administration, would certainly intensify that interest and stimulate all forms of welfare work.

He hoped the Advisory Committee on Social Questions would not be tempted to launch into too vast a programme at the outset. Results of practical value could only be secured if efforts were concentrated on a few important subjects. It should also be remembered that child welfare work varied enormously from country to country, and that these variations were natural and often rooted in religion. Hasty international action was thus apt to do more harm than good, and the scope of international conventions was necessarily limited. He urged that the Advisory Committee's activity should be confined to the collection and dissemination of facts likely to be of value to Governments and to social workers, and that action should be left to the initiative of national agencies.

Opium and other dangerous drugs.

" Early in the discussion Sir Krishnama Chari intervened to announce the culmination of the Government of India's policy of reducing and finally extinguishing the export of opium from India. He first paid a tribute to the signal achievement of the League in regulating so effectively the licit trade in drugs. The measure taken for the suppression of illicit trade might not have been entirely successful, but the organs of the League were facing the problem courageously, and it was to be hoped that, with the co-operation of the Governments concerned, there would be a steady improvement in this respect also.

It was unnecessary to re-state the policy of India in regard to opium, but there was one point which should be mentioned. In 1925, the Government of India announced that they had adopted the policy of an all-round reduction and ultimate extinction of exports to all destinations, except for medical and scientific purposes. This programme was to cover ten years. Accordingly, by the end of 1935, all exports of opium from India ceased, with the exception of the exceedingly small quantities occasionally sent to the United Kingdom and a few other places, for purely medical and scientific purposes. This meant a great financial sacrifice for India, as the revenue from the export of opium, which fell from £7¼ millions to £ 1¼ millions between 1910-11 and 1914-15 had now entirely disappeared. This was convincing evidence of India's desire to assist in securing the improvement of the world situation in regard to the trade in opium and drugs.

The internal distribution of opium was also strictly controlled. All stages, from cultivation to the sale to the consumer were closely supervised by the Government and year after year there was a fall in consumption. The total annual consumption per head of the population, including all uses, was now less than three-quarters of one gramme of opium. Public opinion in India was strongly in favour of the policy of rigid control and this strengthened the hands of the Government.

It might safely be said that, in the international traffic, Indian opium was not a factor of importance, and there had been practically no seizures of Indian opium in recent years in illicit international traffic. Further, the Government of India had ratified the Bangkok Agreement in December, 1935.

In conclusion, he expressed the hope that efforts to control the clandestine traffic would be redoubled by the Governments concerned.

In the discussion which followed, several speakers congratulated India upon her achievement, which was mentioned in the Committee's report to the Assembly as one of the factors which favour a solution of the problem of limiting the cultivation of the opium poppy".

International Relief Union.—"The delegate of Venezuela, on whose initiative the report of the International Relief Union for 1935 was referred to the Fifth Committee drew the Committee's attention to the very valuable work done by the Union for the protection of human life in natural calamities. The aim of the Union was not to displace existing organisations or to collect funds, but to act as a centre for advice and co-ordination. In pursuance of this aim, valuable contacts had recently been established with various international organisations.

Sir Krishnama Chari again expressed the gratitude of the Government of India for the valuable help rendered by the Union after the earthquake in Baluchistan.

The Committee adopted a resolution expressing gratification at the work accomplished by the Union and the hope that its beneficient activities would be continued and intensified.'

Port Quarantine.

62. All the major ports in British India have now qualified Health Officers. The Government of India have decided to take over the direct administration of port quarantine of all major ports and, from 1st April, 1937, have discontinued the provincial agency in respect of the ports of Madras, Calcutta and Bombay. Future appointments of Port Health Officers will therefore be made by the Central Government and control of health administration of the ports will be a function of the Public Health Commissioner with the Government of India.

At the time of writing this report, revised rules under Section 6(1) (*p*) of the Indian Ports Act, 1908, are under consideration. For various reasons, it has been found impracticable to go further with the proposal to constitute *ad hoc* port sanitary authorities at the major ports and it is hoped that the port and municipal authorities concerned will be able to do all that is necessary by co-ordination of effort. With the removal of this difficulty, the question of ratification of the International Sanitary Convention, 1926, which has been hanging fire for some years, is once more receiving active

consideration and it is hoped that the Government of India will shortly find it possible to announce their adherence to this Convention. Ratification would without doubt be very advantageous to India and would go a long way to remove the suspicion that centres round shipping arriving at foreign ports from India. India has, in fact, been complying for some considerable time with most of the requirements of the International Sanitary Convention, but unfortunately technical difficulties have up-to-date stood in the way of ratification, although every effort is being made to remove these difficulties as quickly as possible.

Facilities for the treatment of seamen, suffering from venereal diseases, continued to be provided at all major ports.

During the year 1936-37, port health budget allotments were as follows :—

	Total budget provision.	Contributions by Port Trusts, other Deptts. etc.
Madras	16,100	..
Bombay	83,200	40,800
Karachi	48,500	24,200
Calcutta (and Chittagong)	98,900	27,000

The following is the list of ports from which unberthed passenger ships may depart or proceed on voyages and at which they may discharge unberthed passengers.

Aden
Perim

Sind—
Karachi

Bombay Presidency—
Bombay
Revdanda
Salad
Harnai
Dabhol
Borya
Palshet
Ratnagiri
Jaigad
Purnagad
Tiveri
Jaitapur
Viziadurg
Moosakazai
Malwan
Deogad

Bombay Presidency—contd.
Achra
Vengurla
Karwar
Sanikatta
Tadri
Honawar
Kumta
Bhatkal

Madras Presidency—
Madras
Calingapatam
Baruva
Bimlipatam
Vizagapatam
Cocanada
Masulipatam
Cuddalore
Porto Novo
Negapatam
Tranquebar
Toppotturai
Adirampatnam
Tirumulavasal

Madras Presidency—contd.
Ammapatnam
Pamban
Kilakaria
Tondi
Devipatnam
Dhaunshkodi
Tuticorin
Kayalpatnam
Kulasekharapatnam
Cochin
Calicut
Tellicherry
Badagara
Cannanore
Kasargod
Mangalore
Baindur
Coondapur
Hangarakotta
Malpe
Mulki

Bengal Presidency—
Calcutta
Chittagong

Orissa—
Chandbali
Gopalpur

Port Blair

Burma—
Rangoon
Moulmein
Akyab
Bassein
Mergui
Tavoy
Kyaukpyu
Andrew Bay
Ye
Khanti
Palaw
Victoria Point

In connection with the pilgrimage to the Hedjaz, it has been decided that the orders limiting the countersignature of vaccination certificates to certain selected officials should apply also to pilgrims proceeding to the Hedjaz. All local Governments and Administrations and with a few exceptions, all Indian States have agreed to make necessary arrangements to provide for free vaccination and inoculation of Shia pilgrims proceeding to Iraq and/or Iran.

The Government of India in the Commerce Department circular No. 19 of 1937, dated 21st May, 1937, have considered it desirable that in order to lessen risks from fermentation and generation of toxins, the provision storerooms for Indian lascars and other Asiatic and African seamen engaged on foreign-going ships should always be maintained in a clean and dry condition, adequately ventilated and kept free from vermin, etc. It has also been suggested that arrangements should be made whereby new stores are not stowed on the top of old stores and that provisions are brought into use in rotation.

The incidence of major epidemic diseases is shown in maps 1—3 between pages 28 and 29, 34 and 35, and 42 and 43. Table V (*i*) gives reported deaths from the more important diseases in the major port towns, whilst Table V (*ii*) shows figures for rats destroyed within port areas.

TABLE V (*i*).

	Bombay.		Calcutta.		Madras.		Rangoon.		Karachi.	
	Deaths.	Ratio p.m.	Deaths.	Ratio p.m.	Deaths.	Ratio p.m.	Deaths.	Ratio p.m.	Deaths.	Ratio p.m.
Total	29,729	25·6	37,144	32·6	23,397	37·0	10,257	25·7	7,087	28·6
Small-pox	906	0·8	4,382	3·8	3	...	21	0·1	54	0·2
Cholera	5	...	1,544	1·3	138	0·2	18	0·1	...	...
Plague	2	...	1	...	...	...	14	...	4	...
Enteric fever	284	0·2	1,032	0·9	163	0·3	62	0·2	40	0·2
Malaria	89	0·1	618	0·5	113	0·2	84	0·2	26	0·1
Kala-azar	3	...	146	0·1	...	...	4	...	...	...
C. S. fever	228	0·2	432	0·4	...	...	5	...	3	...
Influenza	70	0·1	353	0·3	...	...	5	...	2	...
Measles	146	0·1	314	0·3	5	...	...	...	224	0·9
Dysentery	456	0·4	1,455	1·3	996	1·6	307	0·8	120	0·5
Tuberculosis	1,983	1·7	2,847	2·6	1,136	1·8	1,033	2·6	597	2·4
Other causes	25,557	22·0	24,020	21·1	20,843	32·9	8,704	21·7	6,017	24·3

TABLE V (*ii*).

	Destroyed.	Examined.	Found infected with plague.
Total	40,254	15,422	4
Calcutta	8,677	810	..
Chittagong	125	...	..
Karachi (Wharf)	2,486	287	..
Bombay	6,833	6,833	..
Cochin	3,393	3,393	..
Rangoon	2,740	2,317	..
Bassein	5,067	701	4
Moulmein Town	10,933	1,081	..

In addition, 1,675 rats were caught on board ships in Bombay, 895 in Rangoon and 1,187 in Calcutta. Of these 549, 895 and 463, respectively, were examined but none were found infected with plague.

Deratisation of ships was carried out in Bombay, Calcutta and Rangoon. At Bombay, 47 vessels were deratised and 20 unloaded vessels were given exemption certificates; at Calcutta 48 and 59 respectively; and at Rangoon 36 and 36 respectively. No ships were deratised before discharge of cargo.

Port of Bombay.

63. *Staff and administration.*—Lt.-Col. C. L. Bilderbeck, I.M.S., continued as Port Health Officer.

Incoming vessels.—As before only infected or suspected incoming vessels and pilgrim and African mail ships were medically examined. These numbered 141, with 18,101 members of crew and 27,880 passengers, and included 15 vessels which had had cases of infectious disease during the voyage or had them on the board at the time of arrival. Measles was the cause of infection in 25 cases, chickenpox in 24 and jigger 5. Six vessels having cases of chickenpox and measles on board among their crews or passengers arrived and departed again within 12 days of their arrival. The bills of health granted to these vessels were endorsed to show the diseases which had occurred on board as well as the measures which had been taken before their departure. The international code wireless messages greatly facilitated the work of the Port Health Department.

Outgoing vessels.—A total of 777 vessels, carrying 58,970 members of crews and 50,292 passengers, were inspected. From among the crews and passengers of departing vessels, 86 cases of infectious diseases were detected and these, with 55 passenger contacts, were not allowed to sail. Available information showed that from these ships 95 cases of infectious disease were landed at overseas ports. These included one case of smallpox at each of the ports of Mombassa and Jeddah; 10 of chickenpox; 67 measles; one each of mumps, typhus, encephalitis lethargica, cerebro-spinal fever, scarlet fever and influenza; and 10 of pneumonia. The system of advance medical inspection was continued in the case of larger passenger vessels and this plan greatly facilitated the embarkation of passengers desirous of boarding earlier than the scheduled times for inspection.

The port was declared infected with epidemic smallpox from 22nd February to 6th June and during this period all persons requiring to board ships working in quarantine were previously inspected, whilst coolies and others were vaccinated and their clothing disinfected.

Among 10,762 European members of the crews of 422 cargo vessels, 717 or 6·66 per cent. were found to be either unprotected or insufficiently protected against smallpox, whereas only one person out of 7,437 European members of the crews of 81 passenger ships was found to be unprotected or insufficiently protected. No through passenger was found unprotected. As regards local passengers on 45 ships all the passengers numbering 3,083 males and 1,771 females were found to be protected. On 138 vessels carrying 11,392 male and 9,060 female passengers, 635 males (5·6 per cent.) and 348 females (3·8 per cent.) were found either unprotected or insufficiently protected. Of 1,807 male passengers and 674 female passengers who embarked at Bombay during the year, 12·5 per cent. of the former and 6·2 per cent. of the latter failed to produce vaccination certificates, though advised to be in possession of such certificates in their own interest. A detailed examination of the crews of 19 British, American or other foreign vessels, showed that out of 376 members of their crews, 22 were unvaccinated, 77 had been vaccinated only in childhood, 130 had been vaccinated more than 10 years before and 174 had been vaccinated more than 3 years ago, but within 10 years.

Red Sea Pilgrim traffic.—Every pilgrim ship was thoroughly cleansed and freed from rats prior to the commencement of her first voyage; on subsequent voyages exemption from further deratisation was given only if inspection showed that she was free from rats. As in previous years all pilgrims were

medically inspected and all bedding and clothing suspected to have been exposed to infection was disinfected before embarkation. A total of 4,037 pilgrims in 8 vessels sailed for Jeddah between 31st October, 1935 and 13th February, 1936.

Of the 9 ships which returned from Jeddah with 3,792 pilgrims, six had cases of infectious disease on board ; a total of 41 deaths was reported.

General—(*i*) *Disinfection.*—Eighteen vessels were disinfected on account of infectious disease. The clothing, bedding and other belongings of 41,692 members of crews and passengers were disinfected. A total of 9,763 bundles of clothing and bedding were disinfected at the port disinfection station.

Under Article 28 of the International Sanitary Convention, 1926, 47 ships were deratised and 183 rats were caught, giving a figure of 4·24 rats per 100 traps. Deratisation exemption certificates were issued to 20 vessels.

Four deaths from accidents occurred on board the vessels in the harbour or docks.

Rats and fleas.—During the year, 687,487 rats were destroyed in Bombay city, 6,833 in the docks and 1,675 on 45 vessels. None were found plague infected on examination.

Port sanitation.—The sanitary state of the harbour and of the *bunders* and docks was reported to be generally good. The sanitation of the docks, anti-rat and anti-mosquito measures, etc. remained as before under the charge of the administrative officer, Bombay Port Trust. Anti-mosquito work on larger vessels was not carried out as a matter of routine, but complaints of the presence of mosquitoes were received from 23 ships.

Miscellaneous.—The inspection of food supplies for lascar crews was continued ; 193 samples of *ghee* were taken and in 47 cases as examination showed that they were unfit for human consumption the supplies were condemned.

Port of Karachi.

64. *Staff and Administration.*—Dr. Khambata continued as Port Health Officer.

Incoming vessels.—Seventy-six vessels, including 9 pilgrim ships and 2 country craft, carrying 15,032 members of crews and passengers, entered the port under the quarantine flag. One case of smallpox, 8 cases of chickenpox, 5 of measles, 2 of scarlet fever and one case of diphtheria were detected. Six deaths from acute pneumonia were reported to have occurred on 6 vessels from Jeddah or Basrah.

Outgoing vessels.—These numbered 801, having on board 56,842 members of crews and passengers. One passenger who was in the infective stage of smallpox and 3 cases of chickenpox detected during the medical inspection were prevented from embarking.

Pilgrim traffic.—Two ships with 2,435 pilgrims sailed direct, whilst 7 others from Bombay embarked 3,712 additional pilgrims from this port. Nine incoming ships arrived with 9,561 pilgrims of whom 7,408 disembarked at Karachi ; the remainder continued their voyage to Bombay. A total of 53 deaths was recorded during the return voyages, all from non-infectious diseases. and 45 patients were found to be in the ships' hospitals on arrival.

General—(*i*) *Rats and fleas.*—The anti-rat campaign was continued within the wharf area, 2,486 rats being trapped and destroyed. The average number of rats trapped per day per 100 traps set was 4·4 and an average of 2·4 dead rats per day were found poisoned by bait. None of the rats examined was found infected with plague.

(*ii*) *Port sanitation.*—The sanitary condition of the harbour was satisfactory. Cholera was absent, but six cases and four deaths from plague were recorded; these were in all probability due to imported infection.

(*iii*) *Other matters.*—Provisions and stores for the use of the Asiatic crews of 31 ships were inspected. Of the 95 *ghee* samples analysed 18 were found to be not genuine and unfit for human consumption.

Air-port of Karachi.

65. Captain C. J. H. Brink, I.M.S., acted as Airport Health Officer.

Previously medical inspection had been confined to the crews and passengers on westbound aircraft, but this year for the first time all eastbound aircraft with their crews and passengers were also inspected.

In the case of westbound aircraft, 285 bills of health were issued and 1,052 members of crews and 1,324 passengers were medically examined. A total of 304 eastbound aircraft landed at the port and these with 1,092 members of crew and 1,084 passengers were inspected.

All Imperial Airways aircraft coming from yellow fever infected or suspected areas in Africa were subjected to fumigation with "Pyrocide 20" both at Alexandria and Karachi for part of the year. Seventeen members of crews and passengers from suspected areas were placed under surveillance. The aircraft of the Dutch and French lines which did not fly over or near yellow fever suspected or infected areas in Africa, were exempted from fumigation but were searched for the presence of mosquitoes and other insects.

Draft rules based on the International Sanitary Convention for Aerial Navigation were in course of preparation and it is hoped that these will shortly be put into force.

A few cases of smallpox occurred in the neighbouring Royal Air Force area and steps were taken to vaccinate the population at risk. Precautions were also taken to exclude the public from the landing ground unless vaccinated and to carry out mass vaccination in the neighbouring villages. Six sporadic cases of plague with 3 deaths were recorded in Karachi city but none in or near the airport. Cholera was absent.

Within the airport boundary, all possible steps were taken to prevent mosquito-breeding. Anti-mosquito measures were also carried out in the area surrounding the airport, these including improvement of drainage connected with springs, the filling of dry wells and the treatment of wells used for drinking purposes. Three hundred and three eastbound aeroplanes were searched, but no mosquitoes were found. Experiments with living mosquitoes were carried out in co-operation with the Royal Air Force authorities. These proved that it was possible for mosquitoes to survive the voyage from Africa to Karachi.

A Stegomyia and general mosquito survey of the airport area, from the Royal Air Force boundary up to Malir Railway Station 3 miles to the east, showed an index per 100 houses of *Aedes egypti* 0·43, anopheles 17·68 and total mosquitoes 31·87.

The Airport Health Officer was appointed as medical officer to the airport staff in addition to his other duties.

At the request of the Chief Aerodrome Officer, the Airport Health Officer, trained two aerodrome officers in first-aid and hygiene. The Government of India have now sanctioned the establishment at the Karachi airport of a special annual course in hygiene and public health according to an approved syllabus for the aerodromes staff of the Civil Aviation Directorate. During the year 20 candidates passed the examination and certificates were issued by the St. John Ambulance Association.

Port of Madras.

66. *Staff and administration* :—The Director of Public Health continued to be in charge of Port Health administration and an Assistant Director of Public Health acted as part-time Port Health Officer. The Assistant Director of Public Health in charge of the Epidemiology bureau was deputed to Colombo to study the disinfection with liquid cyanide of imported grain and other port health problems.

Incoming vessels.—These numbered 691 and carried on board 58,008 members of crew and 53,337 passengers. No infectious disease was found except one case of chickenpox and one case of smallpox. These were treated in the infectious diseases hospital.

Outgoing vessels.—A total of 673 vessels with 58,639 members of crew and 49,620 passengers were inspected and granted bills of health.

Disinfection.—The bedding and clothing of deck passengers and crew landing and embarking at this port were disinfected at the discretion of the Port Health Officer.

Rats.—No mortality among rats was found on any vessel.

Port of Calcutta.

67. *Staff.*—Captain C. K. Lakshmanan, I.M.S., took over the duties of Port Health Officer from 10th February.

Incoming vessels.—As usual, only infected or suspected incoming vessels were examined. Consequently, of the 1,192 vessels which entered the port, only 24, with 2,322 members of crew and 3,852 passengers, were inspected. In two vessels, a case of chickenpox was found on board. Two deaths from " other causes " were recorded among 390 European seamen admitted to hospital. Of the total, 47 admissions were due to dysentery, 15 to influenza, 9 to diarrhoea, 7 to malaria, 6 to sunstroke, 2 to simple fever, 1 each to enteric fever and smallpox and 302 to ' other causes '. Amongst Asiatic seamen, there were 130 admissions and 8 deaths, of which 5 and 1 were due to cholera, 6 and 2 to malaria, 2 and 1 to enteric fever, 112 and 4 to ' other causes '.

Outgoing vessels.—Of the 1,203 vessels which left the port, inspections were carried out on 917 vessels proceeding to ports beyond India, with 70,115 members of crew and 41,806 passengers. One case of cholera, one of smallpox, two of chickenpox and two of diphtheria were removed to hospital from six ships lying in the harbour. A total of 500 persons was vaccinated.

General—(*i*) *Disinfection and fumigation.*—Owing to the freedom of the city and port from plague, the routine disinfection of clothing and bedding of Asiatic and African members of crew and deck passengers of outgoing vessels was not enforced, but occasionally steam disinfection of the effects of the crews of seagoing ships and craft was carried out as a precaution against the spread of infectious disease. During the year, 14 seagoing vessels, 29 inland steamers, flats and launches and 69 lighters, bhars and dinghis were disinfected.

(*ii*) *Rats and fleas.*—A total of 1,187 rats were killed on ships by sulphur fumigation and 278 by trapping. The number of rats caught per 100 traps was 5·80. Of the 463 rats examined, none was found infected with plague.

(*iii*) *Port sanitation.*—Sanitation of the port and anti-rat and anti-mosquito measures, etc. continued to be in charge of the Port Commissioners.

(*iv*) *Miscellaneous.*—The Port Health Department continued to inspect lascars' provisions on ships; of the 25 samples of *ghee* and 10 of lime juice examined, 7 and 8, respectively, were found to be below standard. Municipal filtered water was supplied to all ships; both quality and quantity were satisfactory.

(*v*) *Pilgrim traffic.*—Only one ship with 391 pilgrims on board left for the Hedjaz.

Port of Rangoon.

68. *Staff and administration.*—Dr. J. A. Anklesaria, D. P. H., was the Port Health Officer. The Rangoon Port Health Department which had continued on a temporary basis since its inception in 1905 was made permanent in September, 1936.

Incoming vessels.—Altogether 813 vessels from Indian and 400 vessels from foreign ports, carrying 112,033 members of crew and 240,879 passengers were inspected. Twenty one cases of infectious disease were reported on 12 vessels; these comprised one case of cholera, 4 of smallpox, 9 of chickenpox and 7 of measles. Except for 1 fatal case of cholera occurring at sea, one case of chickenpox and one of measles were left at another port and 5 cases of measles were removed to the Contagious Diseases Hospital. In addition, one unreported case of cholera, 6 unreported cases of smallpox, 24 cases of chickenpox and 2 cases of measles were detected on 24 vessels during medical inspection and were removed to hospital. Seven lepers were also detected. Eleven deaths from non-infectious diseases were reported from 11 vessels. In so far as the riverine launches and cargo lighters were concerned, four deaths from non-infectious diseases, 5 cases of cholera, 2 of smallpox, 5 of chickenpox and 1 of gastro-enteritis were reported.

Of a total of 218,993 passengers examined under the Burma Vaccination Act, 143,373 were found unprotected and were vaccinated by the Port Health staff. In addition 621 vaccinations were performed among members of crews. The effects of 1,351 members of crew and 1,815 passengers were disinfected.

Outgoing vessels.—The effects of 34,650 members of crews and 12,331 deck passengers on 520 vessels bound for ports beyond India were disinfected; whilst 10,058 European members of crews and 3,926 saloon passengers were inspected. Vaccinations totalled—members of crews 170 and passengers, 1,060. Baggage coolies numbering 3,562 were inspected and their clothes and uniforms were disinfected prior to their handling of baggage.

One death from a non-infectious disease, 3 cases of chickenpox and one of mumps and one of dysentery were reported on vessels in the harbour.

General—(*i*) *Disinfection and fumigation*:—Thirty-six vessels were fumigated to comply with the measures in force at their ports of destination, the number of rats killed being 705. Deratisation exemption certificates were issued to 36 vessels after inspection; on these 190 rats were destroyed.

(*ii*) *Rats and fleas*.—Measures to prevent the entry of rats to vessels lying at the wharves and in the stream were undertaken. Anti-rat measures carried out in the Port Commissioner's area included trapping, cyano-gassing and smoking of rat burrows; the rats killed by these methods totalled 5,815. None of the rats examined was found plague infected.

(*iii*) *Port sanitation*.—The sanitation of the Port Commissioner's area was kept at a high standard.

(*iv*) *Other matters*.—Anti-cholera inoculations, totalling 655, were carried out on passengers and members of crews. A total of 2,932 vaccinations was performed among the employees of the Port Commissioners. Provisions for Asiatic lascar crews on 328 ships were inspected; of the 255 samples analysed 39 were found to be bad or adulterated.

Port of Aden.

69. The public health of Aden was satisfactory throughout the year. Only two cases of chickenpox from ships were admitted to the Aden Settlement Infectious Diseases Hospital.

2,017 steamers, rigged vessels and 1,110 Bugalows were granted bills of health. 19 ships arrived in the port with infectious disease on board and necessary precautions were taken, whilst the bills of health were annotated according to the circumstances of each case.

Seventeen ships carrying 10,692 pilgrims passed through the Port of Aden; all were medically examined but were not granted pratique. 578 pilgrims who embarked were medically inspected, vaccinated or inoculated against cholera. Pilgrims proceeding from Mukalla to Hedjaz were inoculated by the ships' surgeon on board.

The Port Health Officer visited four ships for the inspection of medicine chests; all defects were remedied satisfactorily.

Kamaran Quarantine Station. Red Sea.

70. The pilgrimage of 1935-36 opened with the arrival of the S. S. "Teiresias" from the Straits Settlements on the 30th October, 1935, and closed with the departure of the S. S. "Akbar" to India on the 25th February, 1936. Twenty-three vessels, 19 British and 4 Dutch, carrying 16,556 pilgrims passed through Kamaran and were dealt with according to the measures prescribed for "healthy" ships in Article XX of the Anglo-Dutch Agreement of 1926. Of the pilgrims 10,565 were from British India, 3,666 from Netherlands East Indies, 1,983 from Straits Settlements and 342 from Arabia.

The health of the pilgrims was good; 20 deaths occurred during the season. One case of confluent smallpox among the Indian crew of the S. S. "Khosrou" was landed at Kamaran on the 11th February, 1936; no further cases were reported. All steamers that called at Kamaran were granted exemption from landing pilgrims. This was made possible through the inoculation and vaccination of all pilgrims embarking at Aden and Makalla. Thus, for the first time in the history of Kamaran, not a single pilgrim was landed.

SECTION VI.

VACCINATION AGAINST SMALLPOX.

71. In a book entitled "The Vaccination Problem" the generally accepted theory of vaccination is described as " based on the common belief that one attack of an infectious disease usually affords some sort of protection against a second attack. That was the tradition which led to the adoption of the older practice of smallpox inoculation. It was thought that, as everyone was bound sooner or later to catch smallpox, it would be better to give them a mild attack in childhood, and so make them less liable to a subsequent attack, and this was the foundation on which Jenner sought to base vaccination, when he asserted the identity of cowpox and smallpox ". Few now doubt that Jenner's discovery has saved very large numbers of people from death and many others from disablement, but it is always useful to include in health reports available evidence in support of vaccination in the hope that some at least of the unbelievers may be converted. In this hope, two new and striking pieces of evidence are given. The following table taken from the annual report of the Director of Public Health, Madras, gives the numbers of attacks and deaths from smallpox and the percentage of deaths to attacks classified according to the number of vaccination marks. The figures were collected from 17 District Health Officers' reports :—

Number of marks.	Attacks.	Deaths.	Percentage of deaths to attacks.
Nil	1,983	574	28·9
One	457	39	8·5
Two	750	35	4·7
Three	360	25	6·9
Four	720	13	1·8

Comparison of the percentage of deaths to attacks in the first category with the corresponding figures in the other four provides a striking proof of the high degree of protection obtained by vaccination. The figures also indicate very clearly the higher protection conferred by the larger numbers of vaccination marks. In 1933, in Madras Presidency instructions were issued that only two insertions should be made, the main reasons for the change being the higher potency of the lymph and a desire to increase the numbers of primary vaccinations without an increase in staff. It is satisfactory to note that the previous practice of making four insertions has now been resumed.

As a second illustration the following figures have been taken from the 1936 report of the Calcutta Health Week Maternity and Child Welfare Centre. Among the infants and children under five years of age brought on to the clinic cards during January to March 1936, 424 were vaccinated and 170 unvaccinated. In connection with an epidemic of smallpox which prevailed in the district during that period, the following figures are interesting :—

No. of clinic children.	Cases of smallpox.	Recovered.	Died.
Vaccinated (424)	3	3	..
Not vaccinated (170)	42	25	17

It will be seen that the case incidence among the unvaccinated was nearly 25 per cent. and that among the vaccinated was 0·7 per cent. The mortality

among the unvaccinated was over 40 per cent., whilst no death occurred among the vaccinated. Further comment is unnecessary.

Vaccination and revaccination statistics.

72. The statistics of vaccination for British India are discussed in a general way in the following paragraphs but, for detailed figures, reference should be made to the table contained in the appendix to this section (page 318). It should be noted that these statistics are for the financial year and not for the calendar year as in the case of other figures contained in this report. This arrangement makes it possible to include all the figures for the whole vaccination season which extends from October to March.

During the year 1936-37, a decrease occurred in the numbers of vaccinations performed in British India as compared with 1935-36, the actual numbers being 24,731,641 (11,047,662 primary and 13,683,979 revaccinations) and 25,356,725 (10,623,029 primary and 14,733,696 revaccinations) respectively. This decrease is not remarkable when one takes into consideration the increases in the total vaccinations which have been recorded in previous years. Compared with the average of the last decennium, this year's figures show an increase of over 38%, whilst the number has doubled as compared with the ten years before that.

In spite of the decrease in the total operations performed, the number of primary vaccinations showed another increase, constituting a record. Examination of the statistics for the present century has shown that a gradual increase in the number of primary vaccinations has occurred in British India, particularly after 1930. It might perhaps be thought that these increases have been due to increases in the annual numbers of births. Although this is true to some extent, as may be seen from the figures given in Table VI (*i*) below, nevertheless most of the credit must be given to the Public Health Departments for their successful efforts to persuade parents to have their children vaccinated. This is corroborated by the fact that, during the period 1901—30, the number of vaccinations performed more or less equalled the number of births registered, whilst between 1931 and 1936, and especially during the last year, the number of vaccinations is higher than the number of births. The number of vaccinations performed per 100 births recorded was nearly 111 during the year under report and about 108 during the quinquennium ending 1935.

TABLE VI (*i*).

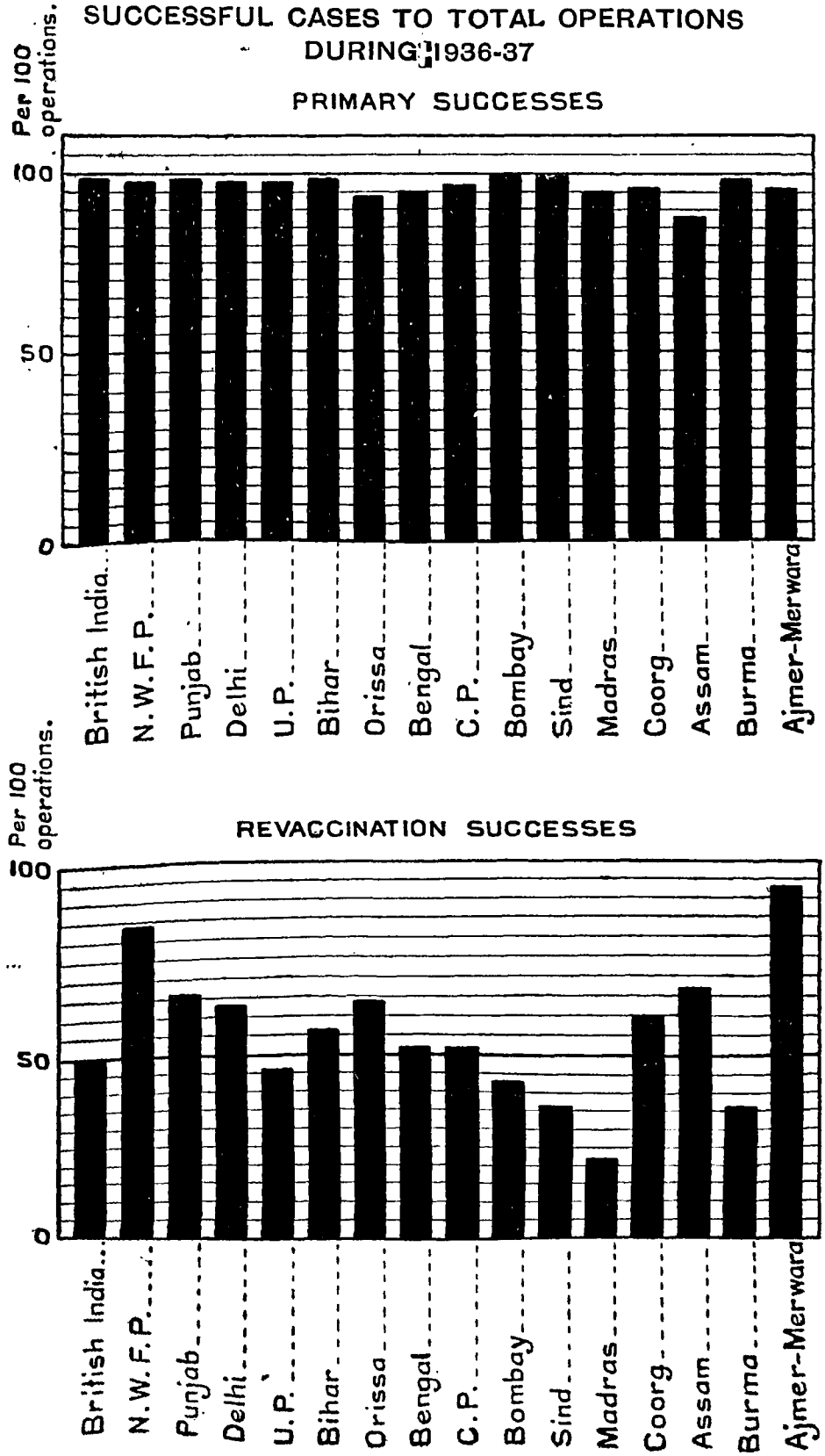
Year.	No. of births.	No. of primary vaccinations performed.
* 1901-1910	8,591,136	8,114,331
* 1911-1920	8,810,018	8,176,566
* 1921-1930	8,345,364	8,563,411
1931	9,135,890	9,618,895
1932	9,054,506	10,090,543
1933	9,678,876	9,919,054
1934	9,288,897	10,128,115
1935	9,698,794	10,623,029
1936	9,981,143	11,047,662

NOTE.—The vaccination figures are for the financial years.
*Birth and Vaccination figures are yearly averages.

As regards revaccination, although the total for 1936 decreased by over a million as compared with the figure for the previous year, it was still 20% higher than the average for the previous five years and the year's total is the highest annual figure on record except that for 1935. The following table indicates that the figures for revaccinations are now more than 18 times those

No. 9

VACCINATION CHART SHOWING PERCENTAGES OF SUCCESSFUL CASES TO TOTAL OPERATIONS DURING 1936-37



recorded during the years 1901—10, about nine times more than those during 1911—20 and four times more than those during 1921—30. The continued increases commencing from 1921 are without doubt due to the preventive campaigns carried on by provincial Public Health Departments, many of which were reorganised and expanded from about that date.

Years.	No. of re-vaccinations.
*1901-02 to 1910-11	745,019
*1911-12 to 1920-21	1,508,811
*1921-22 to 1930-31	3,677,749
1931-32	5,706,429
1932-33	10,618,225
1933-34	12,224,316
1934-35	13,141,109
1935-36	14,733,696
1936-37	13,683,979

*These figures are yearly averages.

In spite of these efforts only about 49 per cent. of infants available for vaccination in British India, taking into consideration the high rates of infantile mortality, were successfully vaccinated during the year. This figure indicates how much more remains to be done and, when it is noted that in Assam, Bengal, Bihar, Orissa and Madras the percentages are as low as 22—37%, it is evident that the vaccination staffs of these provinces have still got a large leeway to make up. Another point worthy of note is that many of the primary and revaccination operation results were not verified, the actual figures for British India being 6% and 25% respectively. Provincial figures in this connection varied from 10% in Madras, 9% in Bengal, 8% in Orissa, 7% in Sind and 7% in Burma to 0·08% in Ajmer-Merwara in the case of primary vaccinations and from 64% in Sind, 44% in Bihar, 43% in Bombay, 31% in Orissa, 29% in Delhi and 28% in Bengal to 0·18% in Ajmer-Merwara in the case of revaccinations.

Success rates.—Success rates for primary vaccinations and for revaccinations, in which the results of the operations were verified, are given below for British India and for the different provinces. The rates for primary cases are with one exception generally satisfactory, but the wide variations in the revaccination rates are difficult to understand and there would seem to be some necessity for investigation of this subject. Especially is this so in provinces, such as Madras, Burma and Sind, where the recorded success rates are very low.

	Percentage of success.	
	Primary.	Revaccinations.
British India	**99**	**50**
N.-W. F. P.	98	84
Punjab	99	66
Delhi	98	63
U. P.	98	46
Bihar	99	56
Orissa	94	64
Bengal	95	52
C. P.	97	52
Bombay	100	43
Sind	100	36
Madras	95	22
Coorg	96	60
Assam	88	67
Burma	99	36
Ajmer-Merwara	96	93

In British India about 56 *per mille* of the population were successfully vaccinated during 1936-37. This rate varied in the different provinces from 101 p. m. in Bengal Presidency to 30 p. m. in Sind. In other provinces the rates were 98 p. m. in the Punjab, 86 p.m. in Delhi, 65 p. m. in Burma, 60 p. m. in N.-W. F. P., 59 p. m. in Assam, 56 p. m. in Coorg, 45 p. m. in Orissa, 43 p. m. in Ajmer-Merwara, 36 p. m. in Bihar and Bombay, and 35 p. m. in U. P., C. P. and Madras. These figures, taken individually and collectively, show that the percentages of vaccinated persons in this country are still much below those necessary to prevent the recurrence of epidemic outbreaks of smallpox and further efforts by all Public Health Departments are essential if this disease is to be kept under satisfactory control.

The average number of vaccinations performed by each vaccinator was 2,883, a figure which cannot be accepted as satisfactory and there still seems to be considerable room for improvement in this direction in most provinces of British India. Averages for different provinces varied from 6,712 in Delhi, 6,193 in the Punjab, 5,441 in N.-W. F. P. to 1,229 in Coorg, 1,307 in Bihar, 1,558 in Ajmer-Merwara, 1,751 in Assam, 1,933 in C. P. and 1,975 in U. P.

The average cost of each successful vaccination in British India was Re. 0-3-7. Wide variations in the provincial figures were reported, that of Sind being Re. 0-13-8, Bombay Re. 0-11-10 and Burma Re. 0-8-4, whilst others were as low as Re. 0-0-10 in Bihar, Re. 0-1-4 in Bengal, Re. 0-1-11 in N.-W. F. P., Re. 0-2-6 in Assam, Re. 0-2-8 in the Punjab and Re. 0-2-9 in Delhi.

Compulsory Vaccination.

73. The statement below gives the number of towns and districts in the different provinces in which compulsory primary vaccination is in force.

TABLE VI (*ii*).

	Towns.			Districts excluding towns.		
	Total No.	No. in which Vaccination Act is in force.	No. to which the Act has not yet been extended.	Total No.	No. in which Vaccination Act is in force.	No. to which the Act has not yet been extended.
British India . . .	1,366	1,017	349	256	125	131
N.-W. F. P. . . .	17	10	7	5	...	5
Punjab	258	244	14	29	27*	2
Delhi	6	6	...	1	1	...
U. P.	439	243	196	48	...	48
Bihar	53	52	1	16	10	6
Orissa	8	8	...	6	2*	4
Bengal	119	119	...	27	27	...
C. P.	112	90	22	19	5*	14
Bombay	130	48	82	20	1*	19
Sind	27	8	19	8	...	8
Madras	81	81	...	24	24	...
Coorg	5	5	...	1	...	1
Assam	32	25	7	14	...	14
Burma	74	74	...	37	28	9
Ajmer-Merwara .	5	4	1	1	...	1

*Including one or more districts to which the Vaccination Act has been extended to parts only.

It will be seen from the above table that vaccination is compulsory only in about 75% of the towns and in less than 50% of the rural areas. Since the annual numbers of vaccinations performed are not sufficiently large to protect the population fully from infection by smallpox, the enforcement of compulsory vaccination of young infants alone cannot banish the disease from India and revaccination should be done before school age and again between 10 and 20 years of age. To achieve this end, further education of the people is required because, even where vaccination has been made compulsory many either from ignorance or apathy fail to comply with the requirements of the Vaccination

Acts. For example, in the Punjab, during the year under review, 2,578 prosecutions were undertaken and 36,973 notices were issued by the District Medical Officers of Health notifying movements of unvaccinated children between one district and another. In Burma 307 persons were involved, whilst in Sind 142 prosecutions were instituted under the Act.

Revaccination is not compulsory except in Madras Presidency, where it is being slowly but cautiously enforced, and in certain areas of Burma. In the absence of smallpox outbreaks, revaccination is not a popular measure, although the common experience is that immediately smallpox appears large numbers of persons,—and not only those belonging to the uneducated part of the community,—are only too ready to obtain the protection conferred by vaccination. There can be no question that, if compulsory revaccination were generally enforced, a large reduction in the incidence of smallpox would result to the great benefit of the whole population of this country.

Vaccine Institutes and Supply of Vaccine.

74. Glycerinated lymph continued to be used throughout British India. The N.-W. F. P. as usual obtained its supplies from the Punjab Vaccine Institute and the provinces of Sind and Orissa continued to obtain their requirements from the Vaccine Institute at Belgaum and Bihar Government's Vaccine Depot at Namkum. In the Burma Institute at Meiktila, seed lymph was rejuvenated by passing through the modified Nijland cycle. Table VI (*iii*) gives details of the lymph produced by and issued from provincial institutes :—

TABLE VI (*iii*).

Vaccine Institutes.	Output in doses.	Issues in doses.
N.-W. F. P. } Lahore Punjab }	7,324,135	7,069,270
U. P., Patwa Dangar	3,276,200	2,991,918
Bihar, Namkum (Ranchi)	3,353,686	3,212,580
Bengal, Calcutta	9,322,828	10,074,210
C. P., Nagpur	945,180	697,615
Bombay, Belgaum	1,964,105	1,447,310
Madras, Guindy.*	4,916,250	3,802,420
Assam, Shillong	1,009,156	1,017,798
Burma, Meiktila	1,826,118	1,961,529

*For the period 1st October 1935 to 30th September 1936 at 2 insertions per case.

The quality of the lymph was everywhere reported to be of high standard. In the Punjab, all vaccine lymph was subjected before issue both to a bacteriological test and to a clinical test on children. In U. P., systematic bacteriological tests showed a complete absence of streptococci and gas-producing anaerobes in all issues of lymph. The number of viable organisms per c. c. was less than the prescribed standard of 5,000 in all lymph issued for use. Almost all issues were treated with chloroform before issue. A potency test on rabbits was made for every batch of vaccine lymph ; in addition, the contents of a number of batches were pooled and then tested in various dilutions ranging from 1 in 1,000 to 1 in 8,000. The test indicated that the vaccine was of uniformly good quality whilst its potency was so great that it was possible further to dilute the vaccine to 1 in 7 instead of 1 in 5 as before. This more diluted vaccine was tried out during the cooler months with good results. All samples of lymph were tested bacteriologically for purity and potency in Bengal and none was issued without carrying out an efficiency test on human subjects. As a result, no complaint was received either as regards purity or potency. In Bombay tests for purity and potency were as usual invariably

made. At the King Institute, all lymph was subjected to the usual rigid bacteriological tests, both at the time of manufacture and before issue its potency was proved to be consistently satisfactory by tests carried on on human subjects in the Saidapet range, which remained under the partial control of the Institute. In this area, 2,355 primary vaccinations were done during the year, with 99·9% success rate and 99·1% insertion success rate. Lymph was issued in a dilution of 1 in 7 throughout the year, except in the months of August and September, when the dilution was 1 in 5. All lymph was treated with clove oil immediately before issue. In C. P. each brew was tested before issue for purity and potency by means of actual vaccinations. At the Vaccine Depot, Meiktila, before issue, the lymph was subjected to animal tests for bacterial contamination and to Calmette-Guerin's international potency test on rabbits. The lymph before issue had to give 100% success without undue inflammation.

The first case of post-vaccinal encephalitis recorded in India was reported from the Punjab. A reference to the case will be found in Section II of this report (page 43).

Lymph yields.—The following table gives the yields of lymph, expressed in grammes, obtained at various vaccine depots from buffalo and ox-calves. The great variations in yield would lead one to suppose that different methods are used in the different vaccine depots and it might be useful for the superintendents in charge to consult with each other and to exchange information. *Prima facie*, the greater the yield per animal, the fewer calves are required and the lower the costs of production.

TABLE VI (*iv*).

	Buffalo calf.	Ox-calf.
Punjab	113·3	31·3
U. P.	70·5	33·2
Bihar	47·6	32·8
Bengal	..	28·0
C. P.	93·2	40·6
Bombay	75·5	25·3
Madras	19·5	28·1
Assam	..	29·7
Burma	456·9	76·5

Experimental work.—Vaccine institutes are, however, not only mere factories for the production of lymph; experimental and other investigations are always in progress with a view to improving the properties of their vaccine lymph.

In U. P., the method of chloroforming vaccine lymph was further developed in order to find out the minimum period of exposure to chloroform vapour consistent with a due reduction in viable orgnisms without any material loss of potency. Possible loss of potency of chloroformed vaccine during storage was also investigated. Four samples stored for over a year were all found to be highly potent and capable of giving a high percentage of success.

In Bihar, vaccine lymph diluted with glycerine showed a tendency to develop an acid reaction on keeping. This change of reaction was found to be more rapid at room temperatures than in cold storage and indicated deterioration. Experiments were planned to determine if redeveloped pox on calves could be used with advantage, but the results so far obtained were inconclusive. Attempts were also made to find out if a one per cent. solution of carbolic acid could advantageously be used to free vaccine lymph more quickly from other germs and render it fit sooner for emergency use. Another investigation was made to determine whether the paste prepared from crude lymph pulp and preserved in crude form in the cold chamber retained its full potency.

At the Vaccine Institute, Belgaum, experimental work on the cultivation of vaccine virus on chick embryonic membranes was being carried out.

Training.—In the Punjab, during the period from November 1936 to March 1937, two untrained vaccinators, 59 private individuals and 10 students of the Tibbia College, Lahore, were trained at the Punjab Vaccine Institute in elementary hygiene, in the method of preparation of vaccine lymph and in the technique of vaccination. In C. P. the seven weeks' course of training for vaccinators included instructions in vaccination, hygiene, epidemiology, vital statistics and ambulance work. One assistant superintendent of vaccination, four teachers, five vaccinators on reserve duty and 73 private candidates were trained. Three vaccinator candidates were trained in Sind. A training class for vaccinators was held as usual at the Vaccine Institute, Belgaum ; 32 candidates took the course and 28 passed the final examination. One chief sanitary inspector and one sanitary inspector were given special training in the preparation and preservation of lymph and in the theory and practice of vaccination. In Burma, the vaccinators' training class was in abeyance, but 23 public health inspectors were given training in vaccination.

Provincial Vaccination Staff.—The staff employed on vaccination work in British India included 8,367 vaccinators. The employment of women vaccinators should be extended in every province as it is difficult for male vaccinators to carry out this work among the female parts of the population.

The staff employed by local bodies in the Punjab increased from 548 to 563 vaccinators ; the special provincial vaccination staff of one superintendent and 13 vaccinators was unchanged. The urban authorities in Delhi employed ten whole time vaccinators and one part time vaccinator, whilst in rural areas only three vaccinators were employed. The staff in N.-W. F. P. consisted of 6 superintendents of vaccination and 47 vaccinators, five of the latter being temporary. In the U. P., the number of assistant superintendents of vaccination remained unchanged but the number of vaccinators decreased to 968. In Bihar, the staff comprised 11 district inspectors, 25 sub-inspectors and 1,187 vaccinators. Licensed vaccinators continued to be generally employed in rural areas, but the Government made provision for 100 temporary vaccinators to be employed during smallpox epidemics. The provincial staff in Orissa consisted of 2 district inspectors of vaccination, 4 sub-inspectors, 19 health inspectors and 34 vaccinators ; the total number of vaccinators employed by local bodies was 234 of whom 12 were employed in towns and 222 in rural areas. Vaccinations were performed by paid vaccinators in municipal areas and in the districts of Ganjam and Koraput while licensed vaccinators were generally employed in other areas of the province. The strength of the vaccination inspecting staff of rural areas in Bengal decreased from 74 to 61, whereas the number of vaccinators increased from 2,043 to 2,178 ; in municipalities no change occurred in the number of inspectors, but the number of vaccinators

increased from 300 to 328. In C. P., there were 35 superintendents of vaccination and 350 vaccinators; in Bombay 25 inspectors of sanitation and vaccination and 341 vaccinators; in Sind 80 vaccinators; in Coorg 10 vaccinators; in Assam 451 vaccinators and in Ajmer-Merwara 16. There were 38 superintendents of vaccination in Burma, 122 part-time supervisors, 21 inspectors of vaccination and 352 vaccinators.

Indian States.

75. *Punjab States.*—Statistics of those Indian States which maintain their own establishments are given below :—

	Vaccinations.		Success-rates.	
	P.	R.	P.	R.
Patiala	61,157	37,672	99	80
Bahawalpur	41,745	4,643	100	99
Nabha	12,897	1,360	98	75
Jind	12,103	3,440	96	44
Kapurthala	9,545	5,759	95	84
Faridkot	5,734	4,938	99	63

Shan States (Burma).—The staff consisted of 2 superintendents of vaccination, 2 part-time supervising officers and 45 vaccinators. Vaccinations performed were 88,586 (60,709 primary and 27,877 revaccinations). Of the verified primary cases and revaccinations 98% and 45% respectively were successful. The average cost per successful case was Re. 0-8-7.

Mysore State.—270,262 vaccination operations (184,580 primary and 85,682 revaccinations) were performed as compared with 406,814 in the previous year. Of these 165,599 or 61% were successful, 81,169 or 30% were unsuccessful and in 23,494 or 9% the results were not known. Excluding the unknown cases the success rates in the case of primary and revaccinations were 86 and 21% respectively. The cost per successful case was Re. 0-6-0.

In the city areas 41,253 vaccinations (19,969 primary and 21,284 revaccinations) were performed. Of these 49% were successful but in 9% the results could not be ascertained.

As in the previous year, the potency of the lymph was tested and found satisfactory. In addition, the material was tested in the field before issue for general use. From the beginning of the year 1936, only glycerine lymph was produced at the Vaccine Institute which met the requirements of the State in full. The quantity produced was 55,440 grains at a total cost of Rs. 20,760. The animals used for producing the lymph were cow calves purchased from an approved contractor. Rabbits were used for producing the seed virus. The number of buffalo calves used was 35. Lymph sufficient for 320,565 cases was issued.

In the model range constituted under the Bangalore District Board 1,223 vaccinations were done for testing the potency of the several strains of lymph produced at the Institute. The success rate was 97%.

SECTION VII.

PUBLIC HEALTH WORKS.

76. The provision of a sanitary environment forms the foundation on which alone the superstructure of public health can safely be built. The supply of wholesome water, efficient removal and disposal of refuse and nightsoil, the suppression of nuisances, public cleansing, improved housing and the inspection of food supplies—these are some of the basic requirements of a community if it is to maintain a reasonable standard of health. In the seventies of last century when an era of sanitary reform was inaugurated in England by the provision of water-supplies and sewerage systems to urban areas, the idea was ridiculed as " a policy of sewerage, an affair of mains and drains ". Both in their immediate and remote effects, however, these comprehensive programmes of sanitary works have had a profound effect on the health of the country. Cholera which had repeatedly caused havoc during the previous four or five decades disappeared altogether whilst the prevalence of typhoid fever has been reduced to negligible proportions. During 1871-75 the annual mortality from typhoid fever per million living persons was 371 ; by 1926-30 the figure had fallen to 9.

As regards British India, the figures given in Tables VII (*i*) and (*ii*) show that municipal public health expenditure during 1935-36 ranged from 16% to 41% of their total incomes, whilst in the case of district boards the figure was about two to seven per cent. Expenditure on the three items of conservancy, water-supply and drainage formed the bulk of public health expenditure, in urban areas the percentage to the total varying from 53% to nearly 93%. In regard to rural areas, the corresponding figures varied between 5% and 76% of the total.

TABLE VII (*i*)—*Expenditure by Municipalities.*

	Income.	Public Health Expenditure.	Percentage of total income expended on public health.	Expenditure on—			Percentage of Cols. (4) to (6) to Col. (2).
				Conservancy.	Water-supply.	Drainage.	
	1	2	3	4	5	6	7
	Rs.	Rs.		Rs.	Rs.	Rs.	
BRITISH INDIA.	18,30,94,164	4,58,81,134	25	1,78,72,231	1,10,29,007	43,51,628	72
N.-W. F. P.*	23,49,875	4,76,869	20	2,18,599	1,13,070	39,343	78
Punjab	1,89,11,600	46,64,841	25	16,34,794	15,19,117	7,68,984	84
Delhi*	79,62,026	12,62,864	16	4,27,468	2,71,455	1,52,042	67
U. P.	2,21,38,877	91,77,520	41	26,51,639	23,71,090	6,30,683	62
Bihar	66,67,359	20,52,736	31	10,48,308	4,72,235	3,84,603	93
Orissa	9,55,178	2,79,523	29	1,86,824	22,869	22,660	83
Bengal	1,27,52,947	47,18,185	37	24,23,401	9,81,763	3,89,349	80
C. P.	87,32,994	22,82,112	26	11,65,428	4,98,094	2,88,369	86
Bombay	3,87,13,264	61,51,045	16	26,17,689	20,17,150	6,26,022	86
Sind	58,97,715	10,00,537	17	4,37,931	2,27,559	2,20,648	89
Madras	2,60,87,770	78,07,367	30	22,46,809	14,15,109	4,40,585	53
Assam	14,72,254	5,38,982	37	2,90,242	1,67,499	27,576	90
Burma	3,04,52,305	54,68,553	18	25,23,099	9,51,997	3,60,764	70

* For 1936-37.

TABLE VII (*ii*)—*Expenditure by district boards.*

	Income.	Public health expenditure.	Percentage of total income expended on public health.	Expenditure on— Conservancy.	Water-supply.	Drainage.	Percentage of Cols. (4) to (6) to Col. (2).
	1	2	3	4	5	6	7
	Rs.	Rs.		Rs.	Rs.	Rs.	
BRITISH INDIA.	‡18,94,86,512	‡1;10,75,430	‡6	‡3,59,749	‡25,22,813	‡2,21,753	‡28
N.-W. F. P.*	22,47,607	1,14,195	5	3,559	34,239	2,979	36
Punjab	2,41,00,308	6,29,937	3	†	†	†	†
Delhi*	2,95,161	12,667	4	..	..	..	..
U. P.	†	†	†	†	†	†	†
Bihar	1,86,75,861	5,30,954	3	2,59,747	1,39,484	4,189	76
Orissa	36,31,992	2,19,518	6	14,454	43,872	990	27
Bengal	2,36,40,729	29,84,014	13	†	8,03,008	29,561	28
C. P.	1,02,78,804	5,20,174	5	..	28,173	..	5
Bombay	2,39,99,765	6,94,493	3	†	3,37,479	..	49
Sind	64,90,392	1,55,202	2	†	41,087	..	26
Madras	5,98,83,059	42,30,000	7	..	10,23,545	..	24
Assam	41,08,898	1,56,354	4	†	71,157	1,179	46
Burma	1,21,33,936	8,27,922	7	81,989	769	1,82,855	32

* For 1936-37. † Not available. ‡Excluding U. P.

The following table reproduced from the annual public health report of Bombay Presidency gives the dates of completion of certain urban water-works and a comparison of the mean death rates for periods preceding and following installation.

TABLE VII (*iii*).

Town.	Date of completion of water-works.	Mean death rate.* Preceding installation.	Mean death rate.* Succeeding installation.	Mean death rate from cholera *plus* dysentery and diarrhœa. Preceding installation.	Mean death rate from cholera *plus* dysentery and diarrhœa. Succeeding installation.
Sholapur	1917	61·01	34·96	14·05	3·42
Pandharpur	1911	49·98	49·52	19·60	6·03
Nasik	1913	52·73	33·14	11·33	2·54
Bijapur	1913	30·08	21·45	1·77	2·02
Lonavala	1915	13·68	21·60	1·12	1·10
Karad	1916	18·58	15·21	7·10	1·27
Barsi	1917	44·41	36·92	5·83	1·92
Trimbak	1921	43·88	26·66	2·35	1·94
Poona Cantt.	1916	23·49	12·99	2·07	0·89

* Exclusive of Plague and Influenza.

It is to be noted that after the provision of protected water-supplies, a marked fall in the mean death-rates from cholera, dysentery and diarrhœa have been generally recorded, except in the towns of Bijapur and Lonavala. Equally striking are the reductions in general death-rates, although once more Lonavala provided an exception to the general rule. There can be little doubt that, if local bodies devoted the necessary funds towards the provision and maintenance of protected water-supplies, they would obtain more than an adequate return in terms of better health for the populations under their care.

At the present time, in this country piped water-supplies are almost exclusively confined to urban areas. Table A in Appendix VI gives a list of the towns which possess protected water-supplies. Out of 1,298 towns, only 250 or about 19% have been so far equipped with this primary public health necessity. It must be added, however, that nearly 52% of the total urban populations included in the table enjoy the amenity of a protected water-

supply. Of the towns with a population of over 50,000, about 78% now have piped water; of those with a population ranging between 30,000 to 50,000 about 54% come into this category; whilst of the towns with a population below 30,000 the proportion is as small as 13%. These statistics indicate that gradual but slow progress is being made, but unfortunately instances can be cited where local authorities fail to maintain their installations in efficient working order. It is a deplorably short sighted policy to neglect to provide funds for annual maintenance costs, because this defeats the very purpose for which the original expenditure has been incurred.

As the result of an enquiry made in respect of the standards of bacteriological purity adopted in different provinces for chlorinated water-supplies, it has been found that these standards vary considerably from province to province. The test for lactose fermenters is generally considered to be the most efficient from the point of view of recognition of dangerous organic pollution, but it is desirable that the standard adopted should be sufficiently high to ensure safety. Absence of lactose fermenters in 100 c.cs. of water would seem to be a desirable level of purity at which to aim. Thresh, Beale and Suckling state in their book entitled "The Examination of Waters and Water-supplies", "We are of opinion from the examination of many of these supplies, that treatment, whether it be by filtration and chlorination or by excess lime, can readily and economically yield a product for the most part containing no *B. Coli* in 100 c.c. and we think that this standard should be aimed at."

The following tabulated statement gives details of the standards reported to be employed in different parts of the country.

Province.		Standards.
United Provinces	Filtered and tube-wells supplies	(*i*) Absence of lactose fermenters in 50 c.c. (*ii*) Under 100 colonies count on agar at 37° C. in 24 hours.
	Chemically treated water	(*i*) Absence of lactose fermenters in 100 c.c. (*ii*) Under 100 colonies on agar at 37°C. in 24 hours.
Bombay Presidency	....	(*i*) Absence of lactose fermenters in 100 c.c. at 37°C. in 48 hours. (*ii*) *Nil.*
Madras Presidency	....	(*i*) Absence of lactose fermenters in 60 c.c. at 37°C. after 48 hours. (*ii*) Ordinarily not more than 100 colonies per c.c. on agar at 37°C. after 48 hours.
Punjab	Urban water-supplies (Class A)	(*i*) *B. Coli* (presumptive or typical) should be absent in 100 c.c. (*ii*) Not more than 50 colonies on agar in 24 hours.
	Municipal water-supplies. (Class B)	(*i*) *B. Coli* (presumptive or typical) should be absent in 10 c.c. (*ii*) Not more than 80 colonies on agar in 24 hours.
	Municipal water-supplies (Class C)	(*i*) Absence of *B. Coli* in 2 c.c. (*ii*) Not more than 100 colonies per c. c. on agar in 24 hours.
Bengal Presidency	....	(*i*) No presumptive *B. Coli* in 100 c.c. (*ii*) Total colonies in agar at 37°C. in 48 hours not more than 100 per c.c.

The question of village water-supplies has been the subject of recent investigation. From information provided by provincial Governments it appears that in at least 30,000 villages the water-supply is either situated at such a distance as to cause considerable inconvenience to the inhabitants or the supply is totally inadequate to meet their needs, particularly during the hot weather. In one province alone the number of villages included in the list numbered over 13,000. It is hoped that the results of this investigation, which was carried out by the provincial Governments at the request of the Government of India, will have brought home to all concerned the urgency of the rural problem in respect of adequate and safe water-supplies. During the past few years, block grants made by the Government of India for rural reconstruction have been utilised to a considerable extent for the improvement of rural water-supplies, but obviously much more requires to be done in this direction.

The provision of markets and slaughter-houses and their sanitary supervision form an important function of local authorities, both urban and rural. Lack of control in regard to the preparation and sale of articles of food is so general that the remarks made in 1931 by the Royal Commission on Labour still hold good for most parts of the country :—

" All kinds of food, grains, vegetables and fruit are exposed for sale in such a way as to become quickly contaminated, and in many areas are retailed on the road side and in the vicinity of the street gutters. "

The Commission recommended that in all urban and industrial areas, the local authorities should construct sanitary markets on convenient sites and should take steps to ensure that the food sold in them was protected, as far as possible, from contamination. The total expenditure incurred by urban authorities on markets and slaughter-houses during the year 1935-36 is given below for a number of provinces :—

	Rs.
Punjab	1,37,853
U. P.	1,15,466
Bihar	32,279
Orissa	17,279
Bengal	43,312
C. P.	1,15,803
Bombay	3,07,454
Sind	7,225
Madras	3,03,241
Assam	16,491
Burma	7,33,319

It is obvious that a great deal remains to be done before it can be said that the Royal Commission's recommendations have been complied with. Even where markets of a reasonably sanitary standard are in existence, the local authorities concerned frequently fail to prohibit the sale of food in unauthorised places and take no steps to prevent food contamination. As in the case of water-supplies, capital expenditure does not give the return in improved health which it ought to provide, because of this lack of continuity of effort.

North-West Frontier Province.

77. Expenditure on public health measures by municipal committees, notified area committees and district boards increased as compared with the previous year. Government grants-in-aid for public health purposes were less than in the previous year and amounted to Rs. 9,414 in the case of municipalities and notified areas and to Rs. 3,500 of district boards.

No major public health works were carried out. No piped water-supply is provided in any of the rural areas. Most of the slaughter-houses in the province are of an old type lacking in modern sanitary requirements.

Punjab.

78. In spite of the continuation of financial stringency and the consequent lack of adequate funds for grants-in-aid to local bodies by the Sanitary Board, comparatively satisfactory progress was maintained in the Punjab in the development of new sanitary engineering works throughout the year. Several important schemes were commenced and a number of new pumping plants and other mechanical installations were installed or were in course of installation. A total of 55 important public water-supply schemes, with a capacity of over 20 millions of gallons per day, have either been completed or were under construction. Fifteen water boring schemes were in hand and a number of shallow tube-wells for hand pumps were also sunk.

Eighteen of the larger water-supply and drainage schemes were maintained and operated by the Public Health Circle of the Engineering Department on behalf of local bodies. The Superintending Engineer again commented on the defective condition of nearly all drainage and water-supply works, whose control was vested in local bodies.

Five preliminary and fourteen new detailed Government projects were prepared by the sanitary engineering department and the previous estimates for one preliminary and three detailed projects were revised during the year. The most important of these were (1) an amended air conditioning scheme for the High Court, Lahore (Rs. 5,14,000) ; (2) improvement to water-supply and sanitary works, Minto Park, Lahore (Rs. 2,53,300) ; (3) water-supply, drainage and sanitary installation for the proposed Central Jail, Amritsar (Rs. 1,99,000) ; Burewala Mandi water-supply scheme (Rs. 1,03,941) ; Pirmahal Mandi water-supply scheme (Rs. 78,139) ; and Vehari Mandi drainage scheme (Rs. 78,134). Nine preliminary and 11 detailed projects were prepared and 2 preliminary and 3 detailed projects were revised for local bodies. These included Abohar drainage extension scheme (Rs. 3,53,882), Batala drainage scheme (Rs. 2,93,423), Khanewal drainage scheme (Rs. 1,62,631), Gidderbaha Mandi water-supply scheme (Rs. 1,56,821) and Gidderbaha Mandi drainage scheme (Rs. 1,18,403).

The three rural water-supply schemes functioned satisfactorily. A further extension for one of these was in hand.

The water-supplies of Nurpur fair in Rawalpindi district and Jawala Mukhi fair in Kangra district, worked satisfactorily both during the fairs and for the rest of the year. The permanent water-supply scheme for Choa and Katas fair in Jhelum district was put into operation and about 593,000 gallons of water were supplied and distributed. The water-supply at the Sun Eclipse Fair at Thanesar was ample and the sanitary arrangements proved reasonably adequate. Proposals were prepared for a permanent water supply for Phalgu fair in Karnal district at a cost of about Rs. 14,000 whilst at the Pehowa fair in the same district, pumping plant loaned from Thanesar was erected and operated for the period of the fair.

A sum of Rs. 77,970 was placed at the disposal of the Sanitary Board during the year under review for grants-in-aid to local bodies, both for improvement of rural water-supplies and for carrying out urgent schemes in urban and rural areas. Of this total, Rs. 14,906 was spent on urban and the remainder on rural works. Of the former an important scheme was Murree water-supply

extension scheme (Rs. 6,960). The latter included the supply of drinking water in rural areas of Hissar district (Rs. 20,000) and the construction of two percolation wells in Dera Ghazi Khan district (Rs. 15,184).

Delhi.

79. Responsibility for the supply of filtered water for the urban areas rests with a joint Water Board. An extension scheme was in progress in order to prevent shortage during the months when the river is at a low level.

Rural water-supplies continued to be obtained either from shallow wells or from rivers and canals. Two tube-wells, with the ultimate object of closing open wells, were installed at Alipur; tube-wells were also proposed for six villages in different areas of the province.

The greater part of New Delhi is now provided with a water-borne system and this is being rapidly extended. In the Notified Area, the dry system of conservancy is still in force in some quarters, whilst Delhi City for the most part still works on the dry system. All water-borne sewage is dealt with at Kilokri sewage farm by land treatment, but the available area of land is much too small to meet requirements, so that it has become both water-logged and sewage sick. After a preliminary investigation carried out by the Public Health Commissioner and Superintending Engineer (Health Services) who recommended the adoption of a modern system for treatment of the Delhi sewage, the Government of India appointed a committee to report on the situation. The Committee recommended the abandonment of the existing sewage farm and the installation of a new activated sludge plant at a capital cost of Rs. 42,00,000 and a recurring cost of Rs. 4,00,000.

In the rural areas no system of conservancy exists, except in one of the large village centres where nightsoil carts have recently been acquired.

For many years past all refuse from Old and New Delhi has been dumped in the vicinity of the two cities. Owing to the extension of residential areas, this arrangement gradually gave rise to a serious health nuisance and it became obvious that some other method of disposal was essential. After careful consideration, it was decided to acquire land about 7 miles out of Old Delhi and to remove all refuse to that site by means of special railway waggons. Loading platforms were provided at two convenient railway sidings, where the municipal carts discharge their loads into the waggons. The whole scheme, including railway tracks, special waggons, etc., has now been completed and has proved to be a satisfactory solution to a very difficult health problem.

Some progress was made in regard to refuse disposal in rural areas.

United Provinces.

80. Expenditure on health works executed under the Superintending Engineer, Public Health Department, amounted to Rs. 33,70,727, an increase of Rs. 2·9 lakhs. Of this total Rs. 7,31,485 were spent on original water-works and special repairs, Rs. 19,30,876 on water-works maintenance, Rs. 4,01,882 on drainage works and Rs. 3,06,484 on other works. Projects to the value of Rs. 18,90,973 were finally sanctioned; others involving an expenditure of Rs. 18,48,800 were submitted but not sanctioned. Projects estimated to cost Rs. 19,13,300 were under preparation and other schemes costing Rs. 2,96,200 were delayed for want of staff.

In regard to rural water supplies, the number of new sanitary wells provided during the year totalled 1,326. District authorities were asked to apply to the Board of Public Health for financial assistance for rural water-supply schemes.

General drainage conditions in the large towns in the plains were reported to be deteriorating. Small drainage schemes were carried out in Hardoi, Deoria and Dehra Dun and a comprehensive scheme was in hand for Hardwar. Properly laid-out sewage farms are in operation at Lucknow, Allahabad, Muttra and Dehra Dun.

Of the Rs. 1,79,431 placed at the disposal of the Board of Public Health, Rs. 75,104 were spent on special assistance to pilgrim centres, Rs. 48,411 on urban sanitation, Rs. 53,792 on rural and minor sanitary works and Rs. 2,124 on other works. The grant for pilgrim centres included Rs. 55,057 for Hardwar drainage scheme and Rs. 2,797 for arrangements at Piran Kaliar fair. Improvements in urban sanitation included Rs. 14,849 for Hardoi drainage, Rs. 10,000 for Lakhhibagh drainage scheme, Rs. 8,000 for Gorakhpur drainage extension and Rs. 7,000 for acquisition of land for the installation of water-works in Ghazipur, whilst Rs. 2,124 under other works was spent on Dewas fair water-supply scheme. Projects sanctioned by the Board of Public Health included water-works to the value of Rs. 6,84,031; drainage and sewerage works Rs. 8,12,812 and others Rs. 10,77,036. Loans were sanctioned by Government for works to the value of Rs. 14,48,762.

Bihar.

81. Full details of income and expenditure in municipalities and district boards are contained in tables VII (*i*) and VII (*ii*) on pages 185 and 186.

Recommendations made by the Assistant Directors of Public Health involving minor expenditure were carried out by the municipalities themselves, but those involving higher costs such as major projects for improved drainage, slum clearance, etc., were postponed because of lack of funds.

Orissa.

82. Work on the main Puri water-supply scheme was completed with the exception of a water-supply to the staff quarters, erection of meter testing plant and installation of one zone meter. Work on the supplementary scheme for extension of the distribution system was completed. The Puri water-supply was maintained in a state of efficiency on behalf of the Puri Joint Water Works Committee and a satisfactory supply of pure water was given throughout. A tube-well with a hand pump was installed in Kendrapara.

Bengal Presidency.

83. The proportion of total receipts spent on public health measures in municipalities further fell from 42% during the previous year to 37% during the year under review. Important municipal sanitary schemes included Howrah drainage improvement Rs. 11,600, Serampur water-works Rs. 61,567, Uttarpara water-works Rs. 10,888, Jessore drainage Rs. 7,254, South Suburban water-supply Rs. 7,000, Tullygunge water-supply Rs. 5,703, Bhatpara drainage Rs. 7,572, Faridpur water-supply Rs. 6,444 and Dacca drainage Rs. 13,435.

Union Boards numbering 4,810, with a total income of Rs. 93,96,267 spent Rs. 7,83,354 on water-supply, Rs. 82,416 on drainage and Rs. 75,370 on conservancy.

Although financial stringency prevented Government from making the usual grants from provincial revenues towards the cost of municipal sanitary projects, the municipal boards were generally able to devote greater attention

to the problems of water-supply, sewerage and drainage in urban towns and continued to finance such projects by means of loans and local contributions. As a result, a considerable expansion took place in the work of the Engineering Branch of the Public Health Department and a great deal of progress was made in the investigation and preparation of new water-supply drainage, sewerage and other sanitary schemes. Capital expenditure on sanitary engineering schemes totalled Rs. 6,27,121 including Rs. 5,70,472 on water-works and Rs. 56,649 on drainage and sewerage works. Sketch projects for schemes estimated to cost Rs. 28,47,350, detailed projects costing Rs. 14,54,300 and detailed estimates and plans for miscellaneous works estimated to cost Rs. 2,90,861 were prepared.

Valuable assistance was rendered by the Engineering Branch of the Public Health Department to Municipal and other local authorities in the shape of inspection and advice as well as of supervision. The department in particular was called upon to examine and approve schemes of water-supply based on tube-wells proposed to be financed by district boards out of loan funds.

The Sanitary Board which met seven times during the year examined various projects of sanitary engineering before their submission to Government, considered inspection reports made by the departmental officers, reviewed the periodical reports on the analyses of samples of water from various sources in the province and suggested remedial measures where necessary.

Central Provinces.

84. The general situation with regard to water-supplies still remained unsatisfactory and only minor changes occurred during the year under review. Schemes for protected water-supplies in a number of towns were under consideration, whilst necessary action was taken in respect of deterioration of existing supplies in certain cases brought to the notice of the authorities concerned. A scheme for Nagpur city, costing 24 lakhs of rupees, was sanctioned.

No appreciable improvement in drainage was effected and because of the prevailing financial stringency no large drainage scheme was undertaken. The Municipal Committee of Khandwa spent about Rs. 17,000 on drainage improvements; Chhindwara greatly improved its drainage system ; but in the towns of Seoni and Damoh little change was noticeable although large sums were spent on drainage works. Drainage schemes for three towns were under consideration.

Water-supplies in rural areas are derived chiefly from wells, but in certain cases these are obtained from tanks, rivers and *nullahs*. Especially in Berar, large numbers of villages have either no wells at all or the water is brackish. The main source of water in three districts is from tanks which are usually also used for other purposes. Even in places where public wells exist, certain sections of the community continue to draw their supply from such unsatisfactory sources as tanks and *nullahs*. In saline tracts where wells are useless, proposals for the establishment of protected water tanks were under consideration. During the year a total of Rs. 99,828 from the Government of India grant of Rs. 1 lakh was set aside for the construction of 211 wells in the same number of villages and work on these was in progress.

Although the aggregate income of 73 villages under the Village Sanitation and Public Management Act amounted to Rs. 2,22,476, only the small totals of Rs. 6,079 and Rs. 4,381 were spent on drainage and water-supply respectively. Total receipts of " town fund " and other villages under the *Mukaddam* rules

aggregated Rs. 15,281, of which Rs. 279 was spent on water-supply, Rs. 9,443 on cleaning of village sites, and Rs. 140 on drainage. In the *ryotwari* villages of seven districts a sum of Rs. 6,726 was spent on improvement of water-supply.

Bombay Presidency.

85. In Ahmedabad city annual expenditure on public health measures per head of population amounted approximately to Rs. 3-7-3, the average figure in other municipalities being Rs. 2-2-1. Complete sanitary surveys of seven towns were made and 30 towns were the subject of special inspection or report. In many cases, action was taken on suggestions made by the Assistant Directors of Public Health in matters of water-supply, conservancy, etc. Chopda, Belgaum, Pandharpur and Bhusawal constructed surface drains; Sholapur spent Rs. 92,446 on drainage; the whole drainage scheme was being extended at Amalner.

The Nasik system of trenching nightsoil was adopted by 14 municipalities and in four cases this has proved a financial success.

The water-supplies of ten of the larger towns were regularly sterilized and their standard of purity was maintained. Improvements to drainage works were carried out in six towns.

Government placed at the disposal of the Commissioners of Divisions a sum of Rs. 75,000 for distribution among district local boards for improvement of village water-supplies. These grants, supplemented by allotments from local funds and private contributions, were expended on constructing wells, tanks, troughs and cisterns, in repairing old wells and in boring operations. 419 draw wells were constructed during the year, whilst 234 step wells were converted into draw wells.

The Sanitary Board at Siddapur in Kanara district carried out the usual conservancy work.

The Board of Public Health accorded approval to the following projects for execution—(1) Improvements to Sirur water-supply and (2) Ahmedabad Suburban drainage II stage.

Sind.

86. Expenditure on public health measures per head of population was Rs. 2-9-6 in Karachi city and averaged Rs. 2-5-5 in the other municipalities.

The water-supplies in Karachi and Sukkur continued to be maintained at a high standard of purity. At Hyderabad the water is sedimented and chlorinated with perchloron. In Rohri town, only a portion is provided with piped water-supply, water is pumped into a high tank from the river and permanganated but no sedimentation or filtration is done.

Government placed at the disposal of the Revenue Commissioner the amount of Rs. 18,000 for the improvement of village water-supplies and 49 new draw wells were constructed.

Expenditure of district local boards on public health measures varied from 17% to 3% of their income; the average expenditure on public health per head of population varied from Rs. 0-3-8 to 8 pies.

The Board of Public Health work accorded its administrative approval to the scheme of improvements to the Sukkur water-supply.

Madras Presidency.

87. As regards municipalities no new water-supply scheme came into operation during 1936 and 41 towns, municipal and *panchayat*, had the benefit of protected water-supply schemes. Water-supply schemes for Saidapet, Virudhunagar and Karaikudi were under execution, whilst improvements or extensions to existing sources were in progress in 15 municipalities. Plans and estimates for water-supply schemes in three municipalities were completed and were awaiting sanction, while those for 6 municipalities were under preparation. The investigation of Calicut water-supply scheme was completed during the year.

As regards rural areas no new schemes were taken up during the year. Those for Arkonam and Tiruvallur were under execution. Plans and estimates for Vayalpad water-supply were completed, while those for Manapparai and Mettupalaiyam were under preparation.

No new drainage scheme came into operation during the year and only three rural towns possess satisfactory drainage. Drainage schemes were under execution in Bezwada, Bellary, Chingleput, Salem and Tirupati municipalities. Plans and estimates for the scheme for Fort Saint George were completed, while those for Kodaikanal, Madanapalle, Palni, Trichinopoly, Tuticorin and Vizianagram were under preparation.

Assam.

88. Details of total income and expenditure on public health measures both in municipalities and rural areas are given in tables VII (*i*) and (*ii*) on pages 185 and 186.

The Public Works Department expended only Rs. 4,191 on the maintenance of water-supplies, drainage and town-improvement.

Rural water-supplies are reported by the Director of Public Health to be deplorably bad and it is obvious that unless local Boards spend much larger amounts on public health, water-borne diseases cannot be satisfactorily dealt with.

No meeting of the Public Health Board was held during the year.

Burma.

89. *Water-supplies.*—The water-supply of Mandalay town continued to be unsatisfactory, although the number of tube-wells was increased from four to five. In Yamethin, which is situated in the dry zone, a sufficient supply of good drinking water represents a difficult problem. Water is obtained from a tank and two wells, but during the hot weather drinking water has to be imported from neighbouring villages. In Pyinmana, the project of obtaining additional supplies from a tube-well proved a complete failure and the work was abandoned. Work continued on improvement of the water-supply of Lashio town, whilst in Yenangyaung, the local body found that the cost of maintaining the piped water-supply was beyond their means and arranged to obtain their supplies from a pumping station of an Oil Company.

The removal of rubbish and of excreta is ordinarily carried out under departmental arrangements made by local bodies ; in some instances, however, this work is done on contract. *Pucca* drains were provided in some towns.

In rural areas, the supply of drinking water is usually derived from a well, tank, stream or river. Due to financial stringency the local bodies were not able to accomplish much in providing drinking water-supplies. Information

as to the areas where the local water supply required to be augmented was collected and the provincial Government on receipt of a second grant of Rs. 5 lakhs from the Government of India for rural improvement works decided to utilize this sum for the improvement of rural communications and of rural water-supplies.

The Public Health Board remained in a state of suspended animation as during the previous two years. As no funds were placed by Government at the disposal of the Board, no new sanitary engineering works were financed. The Magwe Water-supply Scheme was completed whilst a number of health projects administratively approved by the Board during the last few years, still await funds.

Indian States.

90. *Mysore State.*—The work of the Bureau of Sanitary Engineering is divided into five sections (1) water-supply, including original works and maintenance, (2) drainage, (3) sanitary fittings and bore-hole latrines, (4) town planning and (5) bore-wells. The Bureau was in charge of 14 water-supply installations and the expenditure incurred thereon amounted to Rs. 2,66,263. Eight new installations were completed during the year ; 18 others were in progress. Estimates for eight more were pending sanction. The amounts spent by the Department on drainage works was Rs. 1,42,095 and on sanitary installations Rs. 20,869. Over a dozen places were surveyed and plans for town improvement were drawn up in seven cases. Twenty-nine bore-wells were completed and 30 bore-hole latrines constructed.

Federated Shan States, Burma.—Total income was Rs. 50,43,267 ; Rs. 2,75,844 in towns and Rs. 47,67,423 in rural areas. A total of Rs. 1,47,908 or about 3% was spent on public health measures ; Rs. 83,784 or 30% in towns and Rs. 64,124 or 1% in rural areas. Expenditure on water-supplies amounted to Rs. 10,879 for urban areas and Rs. 2,255 for rural areas ; and that on conservancy to Rs. 45,275 and Rs. 21,637. In urban areas Rs. 7,630 was allotted for drainage and Rs. 11,922 on markets and slaughter-houses ; expenditure on drainage in rural areas amounted to Rs. 2,635.

SECTION VIII.

LABORATORIES AND MEDICAL RESEARCH.

Central Research Institute, Kasauli.*

91. Colonel J. Taylor, I.M.S., was Director of the Institute and continued to act as Editor of the I. J. M. R. and I. M. R. Memoirs throughout the year. Other I. M. S. officers of the Medical Research Department who served on the staff were Lt.-Colonel Webster, Major Mulligan, Major Read and Captain Mullick.

The major routine work of the Institute continued to be the production of vaccines and anti-venom serum for the use of the Army in India and for civil use in certain areas. The two vaccines, which were produced on a large scale were anti-cholera vaccine and T. A. B. vaccine. As many Provinces have in recent years themselves undertaken the manufacture of anti-cholera vaccine there has naturally been a falling off in demand from the Central Research Institute and a limited area only is now supplied. The demands for T. A. B. vaccine are chiefly for the use of the Army in which a high state of inoculation is maintained; issues for this purpose remain at a steady level. Smaller quantities of other prophylactic and curative vaccines were issued. There has been an increasing demand for anti-venom serum during the year, the Institute being the only source of production and supply in India.

The following statement gives the issues of vaccines and sera (in c.cs. or doses) during the years 1935 and 1936 :—

TABLE VIII (*i*).

	1935.	1936.
Vaccines.		
Prophylactic cholera	1,836,820 c.cs.	731,700 c.cs.
Prophylactic mixed typhoid and paratyphoid (T.A.B.)	380,503 ,,	378,035 ,,
Prophylactic influenza	26,342 ,,	9,218 ,,
Prophylactic meningococcus	52,462 ,,	..
Curative (various)	10,790 doses.	9,291 doses.
Autogenous	660 ,,	771 ,,
Sera.		
Anti-venene	5,983 doses.	7,170 doses.
Normal horse	15,900 c.cs.	13,200 c.cs.
High titre (diagnostic)	1,051 ,,	779 ,,

Routine work of the Institute included bacteriological and other examinations required by departments of the Government of India and of examinations on behalf of certain medical institutions. Bacteriological testing of disinfectants was carried out for the Indian Stores Department.

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* Annual Report of the Central Research Institute, Kasauli, including the Annual Report of the Malaria Survey of India for 1936. Manager of Publications, Civil Lines, Delhi. Price Rs. 4.

Abbreviations—

I. R. F. A.	Indian Research Fund Association.
I. J. M. R.	Indian Journal of Medical Research.
D. P. H.	Diploma in Public Health.
D. T. M.	Diploma in Tropical Medicine.
D. M. C. W.	Diploma in Maternity and Child Welfare.
L. T. M.	Licentiate in Tropical Medicine.
I. M. R. Memoirs	Indian Medical Research Memoirs.
M. R. Deptt.	Medical Research Department.
I. M. G.	Indian Medical Gazette.

A type collection of micro-organisms was maintained and added to, this being available for the supply of strains to authorised institutions and individuals requiring specimens for teaching purposes, research work, manufacture of vaccines, etc. The special stable strains of *V. cholerae* used at the Institute for the preparation of anti-cholera vaccine were issued to laboratories in Egypt, Soudan and Burma engaged in the manufacture of the vaccine and to the Italian Government.

The question of the methods to be employed and the strains of *V. cholerae* to be used in the manufacture of anti-cholera vaccine was the subject of a reference by the Far Eastern Bureau, Health Organization, League of Nations, Singapore, and was referred to the Cholera Advisory Committee, I. R. F. A., of which the Director of the Central Research Institute was Chairman. A comprehensive recommendation was made in regard to the principles involved, based on Indian experience and practice. More detailed information is available in section II of this report on page 32.

The Institute continued to be a centre of reference and information and advice on many subjects was given. The extensive specialised library of the Institute was of the greatest value in this connection and its facilities were made freely available to many workers.

Research Work.—Enquiries financed by the I. R. F. A. were in progress during the year on the subjects of (*a*) cholera and (*b*) snake venoms. The Cholera Enquiry was conducted in association with enquiries on the same subject in other parts of India, the work being correlated by an Advisory Committee. An account of the cholera research has been given in section II of this report (page 32).

Snake Venoms.—The phase of work undertaken by the enquiry on this subject was completed during the year... The chief studies were those made on the actions of viper venoms including a comparison of the haemorrhagic, coagulative and neurotoxic actions of species from different countries. The haemorrhagins of all vipers tested were found to be homologous, while their coagulative and neurotoxic fractions differed. In the course of this work, it was found that the coagulative action of *daboia* venom on blood could be maintained with little impairment for over a year when solution was made in 50 per cent. glycerine. Solutions of a strength of 1 in 10,000 are now prepared and issued for use as a local haemostatic.

The mechanisms of the coagulant action of *daboia* venom and the haemolytic action of cobra venom were also studied.

The results of this enquiry have been embodied in 12 papers published in the I. J. M. R.

All-India Institute of Hygiene and Public Health, Calcutta.*

92. Dr. R. B. Lal continued to act as Director. The Institute has dual functions, as a centre for advanced studies in public health and as a centre for research.

The D. P. H. class consisted of 26 students and five attended the D. P. H. and Hygiene course. Of these, 16 were medical practitioners and Bengal alone provided 14 students. Four students took up special courses, three an advanced course in malariology and one the composite course. There was only one student (a member of the W. M. S.) for the D. M. C. W. course

* Annual report of the All-India Institute of Hygiene and Public Health, Calcutta, for 1936. Obtainable free of cost from the Director, All-India Institute of Hygiene and Public Health, Calcutta.

and one for the D.Sc. in Public Health. The latter selected Biochemistry and Nutrition as his special subjects. Twenty-one students passed Part I and 21 Part II of the D. P. H. course.

Department of Vital Statistics and Epidemiology—Teaching.—The D. P. H. students were provided with a course of lectures on the general principles of epidemiology and the special treatment of diphtheria, cholera and plague in order to illustrate respiratory, alimentary and insect borne types of infection. As regards statistics, the course included the collection and methods of compilation of vital statistics in India and their utilisation for the assessment of the health of a community, as well as the elements of modern statistical technique including correlation, probability, the principles of sampling and significance tests. During the session 1935-36, 42 lectures were given and 32 practical classes were held. A special course of three months was also provided.

The researches conducted in the Department of Vital Statistics and Epidemiology were financed by the Indian Research Fund Association and an account of these researches is given in the second part of this section (page 214).

There was a growing demand on the part of research workers, in and outside Calcutta, for help from this Department in the evaluation of experimental data.

Eight papers were published.

Department of Malariology and Rural Hygiene—Teaching.—As usual lectures and demonstrations on malariology, venereal diseases, tuberculosis and other communicable diseases were given to the D. P. H and D. P. H. and Hygiene students. Lectures on the bacteriological and public health aspects of tuberculosis were also delivered to the post-graduate students undergoing the course in tuberculosis carried out under the auspices of the King George's Thanksgiving (Anti-Tuberculosis) Fund. For the first time a three months' special course in malariology was organised.

As regards research, work was carried out to ascertain why *A. culicifacies* does not carry malaria in Bengal, although it is generally recognised as the most active malaria-carrying species in India. Moreover, the *A. culicifacies* found in Bengal is of the same race as that found in other parts of India. Other studies included (i) stages in the life cycle of malarial parasites ; (ii) epidemiological studies in human blackwater fever ; (iii) biochemical studies in human blackwater fever cases ; (iv) malarial haemoglobinuria in monkeys ; (v) cholesterol changes in kala-azar ; (vi) the role of endocrines in resistance to tuberculosis and (vii) the incidence of syphilis in various groups of population. Three papers were published by the officers of this Department.

The Department of Biochemistry and Nutrition gave the usual course of lectures to the D. P. H. students ; in addition one student took the three months' course and another was studying for the D. Sc. degree.

As regards research, the department concentrated chiefly on nutrition. Two physical and nutritional surveys were conducted. These included the examination of nearly 4,500 children in Calcutta and 1,250 in Ferozepore (Punjab).

The B_1 assay of some 80 foodstuffs was completed and work on the B_6 and flavin components was continued. Flavin was being estimated, both chemically and biologically, in a number of foods with a view to finding a

relatively simple and rapid means of determining the contents of this factor in Indian foodstuffs. The absorption of carotene in different diets was investigated both in animals and men.

The bisulphate binding power (B.B.P.) of blood (pyruvic acid) has been shown to be increased in cases of beri-beri in China and in experimental beri-beri in animals. During the year, with a view to elucidating the nature of epidemic dropsy in Bengal, the B.B.P. of the blood of normal individual and of persons suffering from epidemic dropsy, malaria and some other diseases was investigated. The results so far obtained showed that the B.B.P. was considerably increased in epidemic dropsy, chronic dysentery and anaemias as compared with normal subjects, both in Europeans and Indians, although the values obtained were not so high as those found in China with real beri-beri.

The excretion of vitamin B_1 in the urine of subjects on fixed diets was being investigated with a view to finding the general saturation of normal and diseased individuals in this food factor.

The experimental production of cataract in animals by diets deficient in the B_2 factors was investigated. The condition was produced in about 30 per cent. of animals and it appeared to be associated with some factor in the B group other than B_6 and flavin.

Data on the basal metabolism of children in Calcutta were collected with a view to arriving at dietary standards and calories requirements for India.

Seven papers were published in the I. J. M. R. by the staff of this Department.

As in previous year, the *Maternity and Child Welfare Department* was maintained by the Governing Body of the Women's Medical Service. Two lectures and 4 demonstrations in maternity and child welfare and 5 lectures on school hygiene and medical inspection of schools were given to D. P. H. course students.

A statistical enquiry into the causes of maternal mortality in Calcutta was in progress during the year.

*School of Tropical Medicine, Calcutta.

93. Bt.-Col. R. N. Chopra, I.M.S., officiated as Director except from 15th July to 14th August, when Dr. C. Strickland officiated.

The Endowment Fund continued to contribute largely to research and to post-graduate teaching activities in the school, to the supply of equipment and apparatus and to the library in obtaining literature. The tea, jute and mining associations, the Calcutta Corporation, the railways, the Calcutta Turf Club, etc., continued to contribute to this Fund. A donation of Rs. 20,000 was received from the Dempster Telegraph Relief Committee and this sum was utilised in providing four beds for the free treatment of patients suffering from tropical diseases.

The Minto medal for research for 1936 was awarded to Dr. Sundar Rao for his contributions on the problem of filariasis.

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*Annual Report of the Calcutta School of Tropical Medicine and the Carmichael Hospital for Tropical Diseases for 1936. Obtainable from the Director, School of Tropical Medicine, Calcutta. (*Gratis*).

The School continued to function as a centre for post-graduate teaching and medical research. Of the 37 students who took the D. T. M. course of the Faculty of Tropical Medicine and Hygiene, Bengal, 31 passed. Forty-four students appeared at the L. T. M. examination of the same Faculty and 24 passed. Twenty-two students attended the 1935-36 D. P. H. course, of whom 17 were private medical practitioners and 21 passed both parts of the examination.

The Indian Research Fund Association continued to provide funds wholly or partially for twelve enquiries on malaria, indigenous drugs and drug addiction, helminthology, kala-azar, cholera, leprosy, filariasis, epidemic dropsy, anaemia of women and medical mycology. The Leonard Rogers Laboratories under the Endowment Fund, in addition to health propaganda and the maintenance of the museum, also continued to work on hook-worm, respiratory diseases, leprosy, bowel diseases, diabetes, filariasis. The activities relating to this latter group of diseases are briefly reviewed later in this section.

Departmental activities.—(*a*) *Department of Tropical Medicine.*—The teaching for the L. T. M. and D. T. M. was the most important function of this Department. About 130 fractional gastric analyses were done in patients suffering from a variety of conditions. These should be of value as standards for Indians and Europeans living under hospital conditions as few such records exist. Important work was also done in connection with the standard solutions for the Van der Bergh test suitable for tropical climates and in connection with leukaemia.

(*b*) *Department of Bacteriology, Pathology and Helminthology.*—A complete overhaul and standardisation of diagnostic methods employed in the routine section was carried out. Serological methods particularly were so organised that the results can be interpreted and compared with results in other parts of the world. The organisation of media preparation and the development of research on media, utilising products available locally, has progressed. The bacteriophage-therapy experiment in connection with cholera was completed ; it has shown that bacteriophage in bacteriologically proven cases has a definite therapeutic value. Recent work done in this Department brings out the importance of work on bacteriophages contaminating vibrios which appear to be common in strains isolated in India. Investigations on the basic characteristics of the newer choleraphage types, F. to M. were completed.

Work done on epidemic dropsy suggested that rice was etiologically connected with this disease. A more detailed study of the opacities in rice grains pointed to the existence of two factors in the causation ; a transmissable plant virus leading to a later invasion of the damaged grain by soil bacteria. A paper embodying the result of this investigation was published in the I. M. G., April, 1936.

Other work done in the Department related to *Bact. pseudo-carolinus*, curdled milk, standardisation of therapeutic sera, evaluation of bacteriophage as a therapeutic agent and the protective value of different types of sera.

(*c*) *Department of Protozoology.*—Protozoological examination of stools was carried out in 5,498 cases, blood was examined for malaria parasites in 1,609 and 169 cases were examined for rat-bite fever.

Work on monkey malaria was continued. Experiments were being carried out in collaboration with the Department of Pharmacology to ascertain the mode of action of quinine and atebrin on *Plasmodium Knowlesi*. It was

shown that atebrin solution in a dilution of 1 : 50,000 was capable of destroying the parasites even when infection was very heavy. Smears of blood kept in contact with atebrin for 24 hours showed degenerative changes in them and a susceptible host (*Silenus rhesus*) inoculated with this mixture was not infected. On the other hand, a much stronger dilution (1 : 10,000) of quinine failed to kill the parasites as the monkey inoculated with the solution became infected as in the case of inoculation of infected blood unmixed with quinine. Further work was in progress in order to ascertain the limit of concentration of atebrin up to which it has destructive action on the parasite. Some work done on the Wassermann reaction in rat-bite fever showed that persons suffering from this infection do not give a positive reaction. Investigations were also carried on in connection with natural infection of *Spirillum minus* in mice.

The infectivity of *A. annularis* (*fuliginosus*) with three species of human malaria under controlled conditions of temperature and humidity was also studied.

(*d*) *Department of Entomology.*—A survey of the Bengal delta was carried out with the object of formulating an account of the natural condition of the delta and its relation with mosquito breeding and of determining how far the physical conditions were altered and thereby new breeding sites were created by man. This department also investigated conditions which have favoured the sudden outbreak and the disappearance of malaria in villages on the high sand-dune range of Contai whilst the plains around it remain practically malaria free. Other studies included biological differences in the species of anophelines in regard to their susceptibility to plasmodial infection of man; the conditions favouring malarial infection in the hills; experimental and field observations to determine how far the different species of house-frequenting flies were capable of ingesting and passing viable ova.

(*e*) *Department of Pharmacology.*—Work was continued on the pharmacology of snake venoms and camphor compounds. Chemotherapeutic studies were carried out in connection with the action of atebrin in monkey malaria and atebrin-plasmochin combination in human malaria. New and efficient methods were worked out for the estimation of atebrin and lecithin in blood. Research work on indigenous drugs was continued and a number of inorganic compounds used in Hindu medicine were investigated in addition to a number of medicinal plants. In connection with the drug addiction enquiry, the biophysical and biochemical properties of blood serum were studied in opium addicts when under the effects of opium and during the period of abstinence. The lead indicated by these researches in the treatment of opium addiction by the administration of lecithin and glucose gave very successful results. The data on hemp drug addiction were being analysed, and work on medicinal plants and food poisons was in progress.

(*f*) *Department of Chemistry and Physics.*—Research work was carried out on 17 Indian medicinal plants.

(*g*) *Serological and Immunological Department.*—In addition to 14,609 Wassermann reactions and blood-grouping tests in 336 cases, research work on the distribution of blood groups in the Indian army was carried out and a technique for the determination of blood groups from stains was evolved. The study of different antigens used in different Wassermann reaction was continued and the standardisation of certain anti-sera by a precipitin test (ring test) was attempted.

(*h*) *Department of Hygiene.*—The variations of vibrios in flies and the types of vibrios and their persistence in fish obtained locally were studied.

(*i*) *Department of Public Health Laboratory—Practice.*—Work was done on the constants of mustard oil and of the common adulterants. Of special interest was the viscosity value of mustard oil and those of its adulterants, specially niger seed oil. The changes that occur in the constants of ghee as a result of cooking were also studied.

Summaries of research enquiries carried out in the school under the auspices of the I. R. F. A. are given in the second part of this section (page 214). A summary of the various researches carried out under the auspices of the Endowment Fund is given below.

Anaemias and respiratory diseases.—The clinical trial of a special vaccine prepared from virulent cultures of two types of pneumococcus isolated in Assam gave encouraging results. The work on anaemia among tea garden coolies in Assam was continued. Among the coolies the macrocytic type of anaemia was common. Previous work had shown that this form of anaemia was not influenced by dietetic treatment, but that it could be cured by the administration of iron. On the other hand, the severe and prevalent macrocytic type of anaemia was found to be amenable to dietetic treatment. In collaboration with the All-India Institute of Hygiene and Public Health, Calcutta, the particular dietetic factor responsible for improvement in the macrocytic cases was under investigation.

Helminthology.—Work was continued in connection with improvement of the treatment of common helminthic infections and comparative tests were carried out between the newer and some of the older anthelmintics. In collaboration with the Entomology Department, various species of flies were examined to ascertain their capacity to act as carriers of ascaris eggs. It was considered that other factors than the direct transmission of eggs from the hands to the mouth must be in operation especially among adults, because of the relatively high infection rate with this worm in many parts of the country.

The cysticercus common in pigs in India was identified as the larval form of *Taenia solium.*

Dermatology.—A detailed study of *Epidermophyton crusis* was in progress with a view to determining discoverable differences in the various strains. It was thought these might explain the varying reactions to different fungicides and the different cutaneous reactions in patients to what appears to be the same fungus. Cheiropompholyx was the subject of intensive study, in order to determine the proportion secondary to ringworm and that due to other causes. The possibility of certain skin diseases of unknown etiology being caused by filterable viruses had been the subject of investigation for the past two or three years and treatment based on this theory was shown to be satisfactory.

Leprosy.—For research work on leprosy reference may be made to section II (page 79).

Bowel diseases.—This enquiry worked in close collaboration with others engaged in cholera work. Research was centred round the vibrios, more particularly the rôle of different types of vibrios in the etiology of the disease. Work at the School has shown that in certain persons, suffering from cholera and passing typical rice water stools, only non-agglutinable vibrios can be found in spite of extensive search. Evidence obtained suggests the existence of choleragenic properties in certain types of non-agglutinable vibrios.

Diabetes.—The cholesterol content of the blood of normal healthy Indian subjects was studied and standards for Indian subjects were worked out. Investigation on the problem of hypercholesteremia in diabetic subjects has yielded important conclusions of which the most useful appears to be that the degree of hyper-cholesteremia in diabetes is a more satisfactory index of the severity of the disease than any one of the other single factors, including hyperglycaemia. Another important observation was that the cholesterol content of blood in diabetes bore little relationship to the state of hyperglycaemia.

While investigating the question of diabetes in children and young adolescents, the interesting observation was made that sexual immaturity, mainly evidenced by unusual delay in the appearance of primary and secondary sexual characters, was in most cases associated with this condition, particularly in females.

Filariasis.—It has been shown that the larvae of *Wuchereria bancrofti* do not survive for more than a few minutes in 0·2 per cent. HCl. Gastric juice and bile have a similar effect on the larvae. Experiments were carried out to test the theory of periodicity of cyclical parturition of *Wuchereria bancrofti*. Hydrocele fluids, aspirated at different periods of the day and night did not show any great variation in the number of microfilariae, showing that in a closed sac like the tunica vaginalis there is no such periodicity.

The optimum conditions of temperature and humidity for the development of *Wuchereria bancrofti* in *Culex fatigans* were found to be 80° F. and 60 per cent. respectively. The embryo matured under these conditions in 7 days, the shortest period so far recorded.

A number of drugs, including "A539" and Fouadin, were tried in the treatment of filariasis, but the results were not encouraging.

Dracontiasis.—Experiments on the effect of gastric juice and of bile on infected cyclops were carried out. Even very dilute hydrochloric acid (0·01 to 0·1 per cent.) killed cyclops infected with guinea-worm larvae fairly rapidly. Fresh gastric juices were even more lethal than hydrochloric acid of the same concentration, whilst even gastric juices without free HCl killed the cyclops. The effect of gastric juice would therefore appear to be due to the presence of combined acids other than HCl. No guinea-worm infected cyclops is therefore likely to reach the duodenum alive after passing through the stomach. Studies on the behaviour of cyclops to embryos of *Dracunculus medinensis* and other parasitic hematodes indicated that the cyclops has a specific attraction to embryos of the guinea-worm, a definite seasonal incidence of active infection being noted. The dry season appeared to be most favourable, especially in areas where the water supply was scanty.

Haffkine Institute.

94. Lt.-Col. S. S. Sokhey, I.M.S., was Director of the Institute during the whole period, Major R. C. Wats, I. M. S. and Dr. P. M. Wagle being the Assistant Directors. Dr. B. B. Dikshit worked in the Institute during the whole year.

The Haffkine Institute was the Provincial bacteriological laboratory for the Bombay Presidency and, at the same time, served as the centre for plague research and the manufacture of plague vaccine for the whole of India. It also produced other prophylactic vaccines for the Presidency, including anti-rabic vaccine, while, in addition to research on plague, investigations were made on a number of other problems.

Plague Vaccine and Sera production and plague research.—During the year there was a drop in the demand for plague vaccine, the quantity issued being only 2,643,162 c.c. against 3,051,132 c.c. in 1935. This was due to the fact that the incidence of plague in India in 1936 was much lower than in the previous year, 23,873 attacks against 41,042 attacks in 1935.

Research—Plague Vaccine.—Research into the optimum conditions for the production of a vaccine of maximum protective power and minimum toxicity continued during the year. Interesting and varying results were obtained, both as regards avirulent live vaccines and heat-killed vaccines, by using broth and agar media and by incubating at 27° C. and 37° C. The temperature at which the cultures were killed and the period of heating appeared also to affect the potency of the resulting vaccines. The work was not completed but tentative conclusions were as follows :—

" When vaccines are made by growing the organisms in broth, whether a virulent strain of organisms is used or an avirulent one, whether the growths are incubated at 27° C. or 37° C. and whether the growths are killed by the application of heat (55° C. for 15 minutes) or by the addition of phenol (0·5 per cent.) or by the addition of formalin (0·025 per cent.) the difference between the best and the worst vaccine tends to be low, 1 to 7·5 (0·002 c.c. to 0·015 c.c.). But when the vaccines are made from growths on agar and the same strains, the same temperatures of incubation and the same methods of killing are employed as in the case of broth vaccines, the difference between the best vaccine and the worst tends to be high, 1 to 100 (·001 c.c. to 1 c.c.), and the best agar vaccine is not much better than the best broth vaccine."

Plague serum.—Improvements in methods of manufacture resulted in the production of sera of higher potency. The new serum was being tested in the field, cases being taken in strict rotation for serum treatment and for control. The latest available figures indicated that serum treatment might effect a reduction of mortality. The numbers of cases treated were small, only 25 in each group, but in the serum group 5 deaths occurred whilst 14 deaths were recorded among the controls. These figures gave mortality rates of 20 per cent. and 56 per cent., respectively.

Pharmacological Research.—The effects of plasmosquine on the different systems of the body were studied by the administration of large doses to experimental animals. The drug affected most particularly the circulatory and the digestive systems, the two most important actions being the formation of methaemoglobin and fatty degeneration of the liver.

The result of administration of plasmosquine on pregnant experimental animals was also investigated. No abortion was produced even when doses considerably higher than those used in therapeutics were given. In view of the impending legislation for the control of drugs in this country, work on the biological assay of drugs was also taken up.

Biochemical Research.—Work continued during the year for establishing normal clinical standards for India. In addition this department continued to assist other workers of the Institute in respect of the chemical aspects of their researches and also carried out examinations of clinical material on behalf of general practitioners and hospitals. Nutrition research was also started.

Public Health Chemistry and Bacteriology.—About 8,000 specimens sent by hospitals and dispensaries were examined during the year, of which 4,000 were for the Wassermann test.

Training of Health Personnel.—Three medical officers of health were trained during the year in plague epidemiological and preventive work, as was a member of the Chinese National Quarantine Service. Short courses on plague preventive measures were also given to sanitary inspectors and to twenty students of the College of Sociology, Bombay.

King Institute of Preventive Medicine, Guindy.*

95. Lt.-Col. H. E. Shortt, I. M. S., was Director from 1st October 1935 to 8th January 1936, and Dr. C. G. Pandit for the rest of the year.

Vaccine lymph.—During the year 16,388 grammes of crude lymph were manufactured, representing 98,325 c.cs. of diluted lymph for issue. Details of vaccine lymph and vaccinations will be found in Section VI.

Bacterial Vaccines.—2,067,225 doses of cholera vaccine, 36,628 of T. A. B. vaccine and 57,991 of other therapeutic vaccines were issued during the year. A total of 12,440 c.cs. of cholera bacteriophage was issued, chiefly to Government and railway hospitals; issues of dysentery bacteriophage totalled 38,940 c.cs. There was a 20 per cent. increase in the supply of various sera from 73,282 tubes in 1934-35 to 88,034 in 1935-36.

Bacteriological, serological and chemical examinations.—A total of 12,942 clinical bacteriological specimens was examined. The diagnosis of diphtheria and the detection of diphtheria carriers claimed a good deal of time and attention, all contacts of cases of diphtheria occurring in the city of Madras being repeatedly examined at the request of the Health Officer. Large numbers of specimens were submitted for the diagnosis of cholera, dysentery and enteric fever.

The serological work at this Institute has been steadily increasing. The number of tests carried out in 1935-36 was 55,164, about four times that for 1926-27 (13,826). It was reported that the King Institute had become one of the largest diagnostic centres in the world for the performance of serological blood tests.

The work of the Public Health Section, which is concerned with analyses of water supplies, has also shown steady increase within the past ten years. Every protected supply in the province is examined three times annually, a total of 6,310 water samples were examined during the year. This section also carried out other water analyses at the instance of the Director of Public Health and the Sanitary Engineer.

Special Investigations.—In addition to the above activities, the Investigation Units of the Institute carried out a number of enquiries, for instance, on outbreaks of cerebrospinal fever, enteric fever and dysentery in different places.

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* Report of the King Institute of Preventive Medicine, Guindy, for the year ending 30th September 1936. Superintendent, Government Press, Madras. Price 8 annas.

Research Work.—For detailed information the report of the Director should be consulted.

(*a*) *Cholera.*—The researches on cholera are described in the section relating to the enquiries carried out under the auspices of the Indian Research Fund Association (page 215).

(*b*) *Tick-typhus.*—An enquiry was undertaken to determine the serological types of human typhus in South India, to investigate the vertebrate reservoirs in nature, to search for the arthropod vector or vectors, and to attempt the cultivation of the virus of the disease in artificial media, on chorio-allantoic membrane and in flask cultures, using embryonic tissue.

(*c*) *The cultivation of filterable Viruses.*—Sheep-pox virus was successfully cultivated. Control work was continued on assessment of the nature and value of lesions obtained on the chorio-allantoic membrane of the chick embryo with material presumably containing viruses.

(*d*) *The bacterial flora of the conjunctiva.*—An investigation into the nature of the bacterial flora met with in the conjunctival sac, was made in collaboration with the Superintendent of the Government Ophthalmic Hospital, Madras. From a comparative study of the microscopic findings and the cultural and biochemical characteristics of the organisms so far studied it would appear that (1) the pathogenic organisms of the conjunctiva are not easily cultivable on artificial culture media to the same extent as when they are isolated from other situations ; (2) their viability in sub-cultures even on suitable media is relatively poorer than the latter and (3) heated human blood agar and heated pigeon blood agar have proved to be the most suitable media used for the isolation and repeated sub-cultures of the Morax-Axenfeld bacillus and the Koch-Week's bacillus.

(*e*) *Other studies* included (i) experiments on the transmission of filarial infection from infected to healthy lizards (*Calotes versicolor*) ; (ii) effect of certain waters containing free sodium bicarbonate on the cooking of rice ; (iii) bacteriology of ice cream and allied products ; (iv) study of limnology of impounded surface waters and of algal problems in relation to water supplies ; (v) experiments to see whether the secretion of Kala-azar patients, when introduced into hamsters, would produce the disease ; (vi) collection and identification of sandflies from Madras and surrounding areas ; (vii) tick fever of dogs due to *Babasia gibsoni ;* (viii) attempts to cultivate the plant flagellate *Leptomonas davidi* and (ix) the use of certain insecticidal preparations against dog ticks.

Sixteen papers were published by the workers of the Institute in the Indian Journal of Medical Research and Indian Medical Gazette.

Pasteur Institute of India, Kasauli.

96. The Director of the Institute and the Secretary to the Pasteur Association, for most of the year, was Dr. R. O. A. Smith, I.M.D. ; Lt.-Col. G. Covell, I.M.S. and Dr. J. P. McGuire acted as Directors for short periods.

This Institute was opened in 1900 and its financial resources include a grant from the Government of India, subscriptions from local bodies and Indian States, etc., treatment charges, including the sale of anti-rabic vaccine, and interest on investments.

During the year, 24,897 patients received treatment at the Institute and its 134 subsidiary centres.

This represented an increase of 2,999 patients as compared with 1935. In addition, advice was given from the Institute to 16 persons by letter or telegram. Of the total, 18,620, including 1,357 Europeans, underwent a full course of treatment; 3,971 absconded before the completion of the full course of treatment; and 2,282 were advice cases, *i.e.*, those who were not considered to be at risk, and who did not therefore receive treatment.

Table VIII (*ii*) gives the death rates amongst Asiatics treated at Kasauli and its centres according to the position of wounds :—

TABLE VIII (*ii*).

Position of wounds.	Kasauli.			Centres.		
	Treated.	Deaths.	Rate. %	Treated.	Deaths.	Rate. %
Leg	439	..	..	9,380	35	0·37
Trunk	27	..	..	535	..	..
Arm	205	..	..	4,491	23	0·51
Multiple	60	1	1·67	1,016	2	0·20
Face	50	..	..	670	21	3·13
Multiple face	42	1	2·38	348	14	4·02

Table VIII (*iii*) gives figures, arranged according to lateness of arrival, expressed in days, for Asiatics treated at the Institute and its centres.

TABLE VIII (*iii*).

	Kasauli.			Centres.		
	Treated.	Deaths.	Rate. %	Treated.	Deaths.	Rate. %
1—7 days	702	2	0·28	13,581	74	0·54
8—14 days	64	..	..	1,771	12	0·68
15—21 days	25	..	..	534	3	0·56
22—28 days	14	..	..	114	..	..
Over 28 days	18	..	..	440	6	1·36

Details of the work of the various Pasteur Institutes mentioned will be found in the following publications :—

(1) Pasteur Institute of India, Kasauli—36th Annual Report of Central Committee of the Association and the Report of the Director of the Institute for 1936-37.

(2) Pasteur Institute of Southern India, Coonoor—The Annual Report of the Director for 1936 together with the 30th Annual Report of the Central Committee of the Association for 1936-37.

(3) King Edward VII Memorial Pasteur Institute and Medical Research Institute, Shillong—The 20th Annual Report for 1936. Assam Government Press, Shillong. (As. 15).

(4) Pasteur Institute, Bombay.—Report of the Haffkine Institute for the year 1936. The Govt. Central Press, Bombay.

(5) Report on the working of the Burma Pasteur Institute and Bacteriological Laboratory, Rangoon, for 1936. Superintendent, Govt. Printing and Stationery, Burma, Rangoon.

(6) Annual Report of the Pasteur Institute, Patna, and of the Anti-rabic Centre, Cuttack, for 1935. Superintendent, Govt. Printing, Bihar, Patna.

No death from hydrophobia occurred amongst Europeans. Amongst Asiatics, the dog was responsible for bites in 14,694 cases with 70 deaths, the jackal in 1,622 with 23 deaths ; and other animals in 947 with only 4 deaths. As to the method of treatment, the vaccine employed both at Kasauli and at its centres was a carbolised 5 per cent. Paris sheep brain vaccine. The brain of a sheep, which is completely paralysed as the result of infection with Paris fixed virus, is made into an 8 per cent. emulsion with 1 per cent. carbolic acid in normal saline. This is incubated for 24 hours at 37° C and then diluted with normal saline to make a 5 per cent. emulsion. The vaccine is kept at room temperature for at least 30 days before use. The dosage administered varies from 2 c.c. daily for 7 days in Class I cases to 5—10 c.cs. daily for 14 days in Class IV cases. Serum treatment was also given to a number of Class IV cases at the Institute, as well as at some centres. Complaints attributed to anti-rabic treatment were received from 330 patients, but as usual most of these bore no causal relationship to the treatment. Two cases of post-treatment paralysis were reported amongst Asiatics from the centres ; both eventually made good recoveries. Of the 165 brains examined 81 were found positive.

Research Work.—This included experiments on (*a*) the post-infectional immunizing value of immune serum as adjunct to vaccine treatment, (*b*) the antigenic properties of carbolized 5 per cent. vaccine, (*c*) the virulence of the Paris strain of rabies fixed virus, and (*d*) the antigenic value of monkey brain antirabic vaccine.

Pasteur Institute of Southern India, Coonoor.

97. Major K. R. K. Iyengar, I. M. S., was Director throughout the year.

A total of 493 patients underwent the full course—Europeans 32 and Asiatics 461. In addition, 36 discontinued treatment as the biting animal was not proved to be rabid ; 40 others, presumably at risk, absconded, whilst advice cases numbered 223. In 67 cases treated the biting animal was proved rabid ; in 18 it was certified rabid ; in 212 it was probably rabid according to history ; in 196 the history of the biting animal was unknown. Fourteen persons had bites on the face, 365 on bare and 65 on clothed trunk and extremities and 49 had " licks " on the body.

There were no deaths from hydrophobia. Of the total treated, 455 or 92·3 per cent. were traced six months after completion of treatment.

Semple's carbolised sheep vaccine was used without post-treatment complications. In all, 1,620,751 c. cs. of antirabic vaccine were prepared and 210,147 doses issued. 64,120 c. cs. of 5 per cent. vaccine were issued to veterinary surgeons, although only 659 animals were treated. Of the 443 brains examined, 340 proved positive. The number of clinical and bacteriological examinations further rose to 3,529.

Two medical officers were trained in the technique of anti-rabic treatment. 34 new treatment centres were opened in the Madras Presidency, whilst eight stations in Coorg were recognised as treatment centres.

Out centres.—A total of 15,302 courses of anti-rabic vaccine were issued to these centres, and 11,527 patients had the complete treatment. Those who discontinued treatment because the biting animal was not rabid numbered 321, whilst 2,125 presumably at risk absconded. The total number of deaths from hydrophobia was 19 or 0·16 per cent. ; of these 10 occurred among the completely treated, giving a death rate of 0·09 per cent. Hydrophobia developed during treatment in 7 cases and in two absconders. Two deaths

occurred from jackal bites, one from fox-bite and the remaining 16 from dog bite. The incubation periods varied between 11 and 257 days. Of the total, 10,854 or 94·2 per cent. cases were traced six months after treatment.

The treatment was the same as at the Institute. Two cases of "paralytic accident" were reported.

King Edward VII Memorial Pasteur Institute, Shillong.

98. Lt.-Col. L. A. P. Anderson, I.M.S. was Director of the Institute throughout the year.

Anti-rabic Section.—From the beginning of 1936, vaccine was prepared at the Institute from the Paris strain of fixed virus instead of the Kasauli virus formerly used. The use of Paris virus was recommended by the Rabies Advisory Committee of the Indian Research Fund Association, as controlled experiments carried out a few years ago at the Pasteur Institute of India, Kasauli, appeared to show a definite antigenic superiority of the virus. The method of preparation of the vaccine and the dosage, however, remained unchanged.

2,119 persons applied for treatment at the Institute and its centres, the majority of the patients being treated at the latter. This number is 171 more than in 1935. Of the total, 1,822 persons completed the treatment, 134 absconded before the treatment was completed whilst the number of "advice cases" was 160. Three additional patients, who appeared for treatment in the late incubation stages of hydrophobia, died of that disease whilst undergoing treatment. Records were obtained six months after treatment in the case of almost all patients fully treated, the actual percentage of health returns received being 97·6 per cent. amongst Asiatics and 100 per cent. amongst Europeans treated at the Institute and 96·4 per cent. and 95·4 per cent. respectively amongst those treated at out-centres.

Thirteen deaths from hydrophobia, all among Asiatics treated at the various centres, were reported, giving a death rate of 0·78 per cent. among those treated there.

Only one case of "paralytic accident" occurred after treatment in a European male aged 35 years. For the history of this case the report of the Institute should be consulted.

Amongst 102 cases treated at the Institute the biting animal was proved rabid in 13, the animal was certified to be rabid in 4; it was probably rabid according to history in 61; and it was unknown in 24. Of the 73 brains examined, 31 were found positive, whilst 15 were unfit for examination.

Vaccines.—During the year 368,898 c.cs. of cholera vaccine, 7,857 c.cs. of T. A. B. vaccine and 3,180 c. cs. of influenza vaccine were issued in addition to 9,89,320 doses of bacteriophage. The issue of cholera vaccine fluctuates considerably according to the incidence of the disease. During 1936 the issue of cholera vaccine was less by 1,07,057 c. cs. than in 1935, when cholera was relatively severe.

Cholera Research.—Reference may be made to pages 33, and 215 of this report.

Burma Pasteur Institute and Bacteriological Laboratory, Rangoon.

99. Major G. C. Maitra, I. M. S., acted as Director of the Institute and Bacteriologist to the Government of Burma. Of the 2,612 cases who attended the Institute for anti-rabic treatment, 1,695 (Europeans 208 and Asiatics 1,487) underwent the full course appropriate to the degree of bite ; 525 were partially treated as the biting animal remained alive and well for ten days after inflicting the bite ; 391 cases voluntarily abandoned the treatment after a few injections, one case of dog bite who had come to the Institute 30 days after the bite, developed hydrophobia after 2 doses of vaccine and died during treatment. Another death occurred in a patient who had had daily 7 c. c. of vaccine for 10 days and in whom treatment was discontinued because the biting dog was reported to be not rabid. The diagnosis of hydrophobia was not confirmed by laboratory observations but he developed hydrophobia two months after cessation of treatment. Advice cases numbered 511. In 270 cases, the biting animal was proved to be rabid, in 30 it was certified rabid, in 1,355 it was probably rabid ; and in 40 the animal was sick but not rabid according to history.

A total of 480 patients underwent the full course of treatment at out-centres and hospitals ; 82 abandoned treatment though they were presumably at risk and in 17 other cases the biting animal remained alive.

Over 200,000 c. cs. of anti-rabic vaccine were manufactured ; 9,596 doses were supplied to districts for treating human cases and 427 for animals. There were 3 cases of " paralytic accident " of which two recovered and one died.

Three human and 115 animal brains were examined and 1 and 86 were found microscopically positive for rabies.

The Paris fixed virus showed attenuated virulence from time to time but occasional sub-passage through guinea-pigs promptly re-established its original virulence.

Bacteriological Section.—A total of 34,727 examinations was carried out these included 29,259 serological, 3,764 microscopical, 994 cultural, 456 chemical and biochemical, 157 histological and 97 miscellaneous. A total of 600 c. cs. of the concentrated anti-meningococcus serum was issued, mainly to the Contagious Diseases Hospital, Rangoon. T. A. B. vaccine was manufactured for the first time and 19,500 c. cs. were issued.

Research work.—A paper embodying observations on the prevalence of typhus fevers in Burma was published in the I. M. G. of October, 1936, and a note on laboratory diagnosis of enteric fevers was published. Strains of cholera vibrio collected from acute cases in the Contagious Diseases Hospital, Rangoon City, were systematically studied and a note on the results was under preparation. A small but sharp outbreak of cholera in one of the large jails was also investigated.

Pasteur, Institute Calcutta.

100. This Institute is a part of the School of Tropical Medicine, Calcutta.

Of the total of 2,727 patients, 930 (Europeans 111 and Asiatic 819) were given a full course of treatment ; 799 came from Calcutta, 479 were referred to other centres to complete their treatment, 1,061 were advised that no treatment was necessary and 257 voluntarily abandoned treatment. The biting

animal was proved to be rabid in the case of 28 persons, in 124 it was certified to be so ; in 581 it was probably rabid according to history, in 192 the history of the animal was unknown, whilst in 5 cases, the animal was probably not rabid. No deaths from hydrophobia occurred, except in three cases which arrived with symptoms of the disease.

The vaccine used was Semple's carbolised vaccine 1 per cent. made from sheeps' brain with the Paris strain of fixed virus. The dose given was 5 c. c. daily for 7 days for licks and 5 c. c. daily for 14 days for bites. The total amount of anti-rabic vaccine manufactured was 463,680 c. cs. As many as 165 treatment centres were affiliated to the Institute and 4,346 courses of treatment were issued to various district hospitals.

Of 28 brains examined, including 24 of dogs, only 9 were positive to rabies.

The centres provided complete treatment for 4,218 patients (Europeans 190 and Asiatics 4,028) with 29 deaths or 0·69 per cent. and rendered advice to 124. Of the fatal cases 2 cases of jackal and 6 of dog bites developed hydrophobia during treatment, the interval between bite and death varying between 16 and 51 days. Thirteen cases developed the disease within 15 days of completing the treatment ; of these 9 had jackal bites and 4 dog bites. The interval between bite and death in these cases varied from 22—49 days. The remaining eight fatal cases developed hydrophobia later than 15 days after completing the treatment and are classed as "failures". Of this group, five had been bitten by jackals and three by dogs, the interval between bite and death lying between 39 and 142 days.

No cases of post-treatment paralysis were recorded either at the Institute or the centres.

Seven medical officers were given a 7 days course of training in anti-rabic treatment at the Institute.

Pasteur Institute, Bombay.

101. This Institute, which is attached to the Haffkine Institute, was opened in 1922 ; in addition 69 treatment centres are now in existence in different parts of the province. In 1922, 243 treatments were issued to out-centres and 429 persons were treated at the Institute, whilst in 1936, 5,259 treatments were issued to the out-stations and 2,331 persons were treated at the Institute.

In Bombay City, the problem of stray dogs and the high incidence of rabies among these animals has become serious. During 1936, of 87 dogs' brains received from the City over 80 per cent. were found to be rabid. This, however, represented only a fraction of the incidence of rabies among dogs in the city and as large numbers of dogs are said to enter the city from the suburbs, the situation seems to demand early attention from the authorities reponsible for the health of Bombay.

Five medical officers underwent training in anti-rabic treatment at the Institute before taking charge of newly created centres.

Of the 2,961 patients who attended the Institute for treatment, 2,331 persons completed the full course of treatment ; 622 were advice cases as the biting animals were alive and well for 10 days after having inflicted the bite ; and 8 discontinued treatment. Only two persons developed hydrophobia after treatment giving a mortality rate of 0·08 per cent.

The total number of brains received for examination at the Institute was 218, including 210 of dogs, 3 of cow-calves, two of buffaloes and 1 each of a jackal, a monkey and a human being. Of these, 4 brains of dogs were received in a state unfit for examination, 44, including 41 of dogs, gave no evidence of rabies and 170, including 165 of dogs, were positive to rabies.

Pasteur Institute, Patna.

102. A total of 4,075 patients including 23 Europeans underwent the complete course of treatment at the Institute and 405 at the Cuttack centre, whilst 325 and 61 cases respectively, were advised that treatment was not necessary; 675 patients left the treatment before completion. Eleven deaths occurred among the Institute cases, giving a total death rate of 0·27 per cent., whilst the rate among the "multiple face" cases was highest, 2·06 per cent; no deaths were recorded among those treated at Cuttack. All deaths occurred among persons bitten on the bare skin. Seven cases arrived with symptoms of hydrophobia and eight cases developed the disease during treatment.

400 patients completed the full course of treatment at the Cuttack centre; 75 discontinued treatment; 61 were advised that treatment was unnecessary; and one patient developed hydrophobia during treatment.

The percentage of Asiatic patients bitten by jackals, 36·6 at the Institute and 39·7 at the centre, was reported to be comparatively high; the corresponding percentages for dogs were 60·8 and 55·2 respectively. Of the deaths at the Institute 72·7 per cent. were due to jackal bites and 27·3 per cent. to dog bites.

Both at the Institute and centre 5 per cent. carbolised vaccine was used, the treatment lasting 7 days for licks and 14 days for other cases. A total of 36,349 c. cs. of the vaccine was issued to the Cuttack centre; the vaccine was also supplied to civil surgeons for 63 human cases and for 16 animals. Fourteen thousand c. cs. of 2 per cent. carbolised vaccine were sold to Nepal.

Medico-Legal Work.

103. Medico-legal work for the provinces of Bihar, Orissa and Assam was undertaken by the Chemical Examiner to the Government of Bengal, that for Delhi by the Chemical Examiner to the Government of the Punjab and that for Ajmer-Merwara by the Chemical Examiner who conducted examinations for the Governments of United Provinces and Central Provinces. Other provinces employed their own Chemical Examiners. The following table summarises the medico-legal work, exclusive of general analysis and other work, done by the Chemical Examiners employed in the different provinces—

	Cases investigated.	Cases detected.	Percentage detection.	Articles examined.
British India . . .	**11,974**	**8,074**	**67**	**37,615**
N.-W. F. P. . . .	440	362	82	1,117
Punjab	2,581	2,081	81	8,858
U. P. and C. P. . .	1,477	1,195	81	4,642
Bengal	2,347	1,512	64	5,520
Bombay	1,255	767	61	4,416
Sind	385	276	72	1,290
Madras	1,398	1,076	77	7,541
Burma	2,091	805	38	4,231

Punjab headed the list for both cases investigated and articles examined. The percentage of detection to the total number of cases investigated was highest in the North-West Frontier Province (82 per cent.) followed by Punjab and United Provinces and Central Provinces (81 per cent.). Burma recorded the low detection rate of 38 per cent.

Cases investigated fell into four groups (1) stains, (2) human poisoning, (3) animal poisoning and (4) miscellaneous. Stain cases amounted to 61 per cent. of the total cases investigated; human poisoning 36 per cent.; animal poisoning 2 per cent.; and miscellaneous one per cent. Of the total articles examined, stains were responsible for 58 per cent., human poisoning for 38 per cent. and animal poisoning and miscellaneous for 2 per cent. each.

Stain cases.—Twenty-one thousand, eight hundred and sixteen articles alleged to be stained with blood, semen, gonorrhoeal pus, faecal matter, etc., were received at the different chemical laboratories, in connection with 7,354 cases, for examination and determination of their origin. Of the total stain cases investigated, Punjab and Burma accounted for 20 per cent. each, Bengal 17 per cent., and U. P. and C. P. 14 per cent. In other provinces this percentage remained between 4 per cent. in Sind and 13 per cent. in Madras.

The percentage of detection for all provinces taken together was 78 per cent. It was highest in Punjab and Madras (93 per cent.), immediately followed by U. P. and C. P. (92 per cent.); in other provinces the rate varied between 79 and 88 per cent., whilst in Burma the percentage of detection was as low as 36 per cent.

Stain cases were further classified into (1) blood stains other than rape and unnatural crime, (2) rape and unnatural crime, (3) seminal stains, (4) mixed blood and seminal stains and (5) other stains. The first group formed the largest proportion, namely, 69 per cent. of the total. This type formed, on the basis of provincial totals for stain cases, the highest proportion in Madras Presidency (93 per cent.) and the lowest in Burma (49 per cent.). In the other provinces the percentages ranged between 83 and 61. Rape and unnatural crime together constituted only 3 per cent. of the total stain cases. In Sind no cases were dealt with, in most other provinces they were infrequent, but in Bengal and Bombay they constituted, 10 and 17 per cent. of the respective provincial totals for stain cases. Seminal stain cases numbered about one-fifth of the total in British India while the fourth and fifth groups accounted for five and one per cent. respectively.

Human poisoning.—Fourteen thousand, three hundred and ninety-six articles were examined in connection with human poisoning. They were associated with 4,244 cases investigated, of which 2,109 or about 50 per cent. were detected. The percentage of detection in the provinces varied from 42 per cent. in Bengal and Burma to 64 per cent. in the Punjab.

Of the total human poisoning cases investigated, Punjab accounted for about 24 per cent., Bengal 23 per cent. and Bombay and Burma 15 per cent. each; in other provinces this rate varied between one per cent. in N.-W. F. P. and 10 per cent. in U. P. and C. P.

Of the poisons detected in human cases, opium and arsenic appeared to be most common all over the country, whilst *dhatura*, alcohol, mercury salts, potassium or sodium cyanide and a few other poisons were used in different provinces.

Animal poisoning.—Two hundred and forty-seven cases, comprising 752 articles, were investigated. Of these 149 cases or about 40 per cent. were detected.

Miscellaneous.—This group included 129 cases and in connection with these 651 articles were examined. Sixty cases or 47 per cent. were detected.

INDIAN RESEARCH FUND ASSOCIATION*.

General.

104. In the following paragraphs will be found a brief summary of the investigations financed by, and carried out under the auspices of the Association during the year under report. Full details will be found in the report of the Scientific Advisory Board for 1936, in the papers published in the I. J. M. R., in its Memoirs and in the Records of the Malaria Survey of India, the Indian Medical Gazette and other journals. A detailed list of these papers is given in Appendix VII, (page 322).

Cholera.

105 (*i*) *Cholera Enquiry* (*Dr. R. W. Linton*).—The work of this enquiry continued to deal with the bacteriology of cholera, with special emphasis on the basic structures of the vibrios. As in previous reports, the work may be considered under several headings, but it is again emphasised that these are simply convenient divisions of what is essentially a single problem, that is, the nature of the vibrio. At present, most emphasis is being laid on the search for a serological basis for the chemical classification. The importance of having a relative simple method for differentiating the six chemical groups lies in the observation that the vibrios appear to fall into one or another of these groups and that there is a good correlation between the source of the vibrios in cases, carriers or water on the one hand, and their chemical grouping and metabolic type on the other. It is hoped that precipitin reactions with highly specific fractions will yield a basis for the serology of the vibrios which they do not have at present.

(*ii*) *Cholera bacteriological enquiry* (*Captain C. L. Pasricha, I.M.S.*)—Cholera cases from the Campbell Hospital were studied bacteriologically in much greater detail than before. Results obtained so far show that there are cholera patients in whom, in spite of very extensive and laborious search, are to be found vibrios which show no 'O' antigenic relationship with the authentic cholera vibrio. Since the beginning of the carrier enquiry at Diamond Harbour in June 1934, up to September 1936, 106,295 samples have been examined. These included stools from healthy individuals and from clinical cholera cases.

(*iii*) *Cholera clinical enquiry* (*Captain C. L. Pasricha, I.M.S.*)—To determine the value of choleraphage in the treatment of cholera, experiments at the Campbell Hospital, Calcutta, were continued over a period of 18 months. The results obtained are being carefully considered.

(*iv*) *Cholera carrier and epidemiological enquiries by Dr. R. B. Lal at the All-India Institute of Hygiene and Public Health, Calcutta.*—The cholera carrier and epidemiological enquiry financed by the I. R. F. A. was a co-operative study in which field investigations and laboratory studies were jointly pursued in order to elucidate obscure points in the epidemiology of cholera. The Department of Vital Statistics and Epidemiology of the Institute was concerned with a field study at Diamond Harbour and a statistical investigation into cholera mortality in Bengal.

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* Report of the Scientific Advisory Board of the Indian Research Fund Association for the year 1936. Price Re. 1, obtainable from the Secretary, Governing Body, Indian Research Fund Association, New Delhi.

In regard to the field enquiry the rôle of the carrier in initiating outbreaks of cholera, the dissemination of infection by patients and the persistence of infection in the human gut and in the environment were among the important questions under investigation.

The statistical study was directed towards the evolution of quantitative methods, of expressing the epidemiological features of the cholera history of a locality and the formulation of suitable methods of forecast.

(*v*) *Cholera enquiry by the Director, Central Research Institute, Kasauli.*—Work was chiefly concentrated on investigation of the serological and bio-chemical characters of the inagglutinable vibrios. Strains not agglutinating with Inaba or Ogawa ' O ' sera were obtained from associated enquiries and from special areas in India, the sources being cases of clinical cholera, carriers and water. The total number of strains examined was 509 and the Director of the Institute expressed the opinion that an extension of investigation in non-cholera areas was desirable because it was likely to throw light on the significance of non-agglutinating vibrios in other areas. The fresh knowledge gained of characters of inagglutinable vibrios is of great value in further investigations and might help to elucidate problems in regard to the significance of such strains in endemic and epidemic areas and their possible aetiological rôle.

(*vi*) *Cholera Bacteriophage enquiry at the Pasteur Institute, Shillong.*—The work of this enquiry consisted of two sections (*a*) basic investigations on vibrios and (*b*) trials on the value of bacteriophage in prophylaxis and treatment under field conditions. Investigations into the value of sera prepared by means of the dried ' O ' antigens for the serological examination of vibrios was undertaken and a report dealing with 118 strains submitted to the Editor of the I. J. M. R. In two small epidemics studied in detail by the Field Unit the case mortality among the bacteriophage treated cases and among untreated cases showed a difference in favour of bacteriophage treatment.

(*vii*) *Cholera enquiry at the King Institute, Madras.*—Examination was made of local strains of vibrio with Inaba ' O ' and Ogawa ' O ' sera. Eighty-nine strains isolated during 1933-35 and maintained in the Institute and 368 strains isolated in 1936 were examined. The biochemical behaviour of the strains was in agreement with the observations of Heiburg, *viz.*, that all strains, agglutinable by either of the above sera, ferment glucose, mannose and saccharose but not arabinose. All the strains were non-haemolytic.

Included in this collection were 24 strains which were isolated from suspected cases of cholera and which were not agglutinated by either type of serum. Further specimens of stools could not be obtained from these cases nor were the clinical histories available. It was proposed to investigate this matter further in cases occurring in Madras City.

With the collaboration of the Director of Public Health, an investigation has been in progress to determine the geographical distribution of these two types of vibrio. The enquiry was not completed but, as far as the available information goes, there is a striking geographical distribution, the northern districts of the province giving the Inaba type, the southern districts the Ogawa type, while in Madras City both are to be found. The differentiation of areas, it is worth noting, corresponds exactly with that described by Russell and Sundararajan some years ago in their epidemiological studies of cholera in Madras Presidency.

All attempts to obtain a potent filterable toxin were unsuccessful. Whilst some filtrates caused definite reaction in rabbits when injected intradermally their toxicity was not sufficient to kill either squirrels or guinea-pigs in reasonable doses.

The squirrel was found to be very susceptible to *V. cholerae*, succumbing to a small dose of vibrios injected intraperitoneally within 24 hours, the vibrios being recoverable from the heart blood in pure culture.

The antigenic and biochemical changes in the cholera vibrio on its passage through the fly were also under investigation.

Leprosy.

106. Leprosy research has been dealt with in detail in Section II of this report (page 79).

Malaria.

107. (*i*) *Malaria Survey of India, Kasauli.*—(*a*) *Classes and instructional work.*—The annual malaria class at Karnal was attended by 20 students (4 Defence Department, 3 Indian States, 8 Civil, 4 Railways, 1 I. R. F. A.). All passed the examination.

The Records of the Malaria Survey of India were edited by the Director. The compilation of bulletins occupied a large amount of the time of the staff.

(*b*) *Anti-mosquito work.*—Observations were made on the (1) value of different insecticidal spraying solutions, (2) anti-larval fish, (3) value of pyrethrum and other larvicides, and (4) the comparative value of different larvicides during the antilarval operations in Delhi.

(*c*) Entomological investigations, field work and surveys were also undertaken.

(*ii*) *Anti-malarial drugs enquiry by the Director, Malaria Survey of India, Kasauli.*—Work carried out in a village near Karnal during the malaria season included (1) house to house visitation to detect cases of fever, (2) treatment of fever cases by cinchona febrifuge, (3) weekly blood and spleen examination by accurate scientific methods. Experiments on monkeys to test the anti-malarial value of certain drugs were also undertaken.

(*iii*) *Malaria transmission enquiry by Dr. B. M. Das Gupta at the Calcutta School of Tropical Medicine.*—Work with *A. stephensi* was completed. The effect of atmospheric temperature and humidity with reference to transmission of malaria by *A. stephensi* will be embodied in a memoir. Work with *A. annularis* (*fuliginosus*) was started and is in progress. During the year under report, 4,212 laboratory-bred clean female *A. annularis* (*fuliginosus*) were fed upon 34 gametocyte carriers (*P. vivax* 12; *P. Malariae* 8; *P. falciparum* 14), and exposed to 10 different combinations of temperature and humidity in the air conditioning cabinet. A gametocyte count, in each case, was carried out on the host just before feeding the mosquitoes.

(*iv*) *Black water fever enquiry by Dr. K. V. Krishnan at the All-India Institute of Hygiene and Public Health, Calcutta.*—The histological and biochemical researches in monkeys suffering from haemoglobinuria as the result of infection with *P. knowlesi* had suggested certain lines of treatment for this condition and these had already produced promising results. Investigations of human cases of blackwater fever were being undertaken.

(*v*) *Assam Medical Research Society.*—The work of this society during the year under review, consisted of (1) a course of training in malariology to qualified medical practitioners; (2) malaria surveys, (3) experiments to evaluate the use of plasmoquine in the field; (4) malaria control experiments in two groups of villages in the Surma and Brahmaputra valleys and (5) a study of the cold weather bionomics of *A. minimus*.

Nutrition.

108. (*i*) *Nutrition Research under Dr. W. R. Aykroyd at the Pasteur Institute of Southern India, Coonoor.*—Attention was focussed on the study of two problems (1) the nutritive value of Indian foodstuffs and (2) the diet and "state of nutrition" of the population.

A systematic survey of Indian foodstuffs was undertaken and its first stage was completed. Some 200 common foodstuffs were investigated for energy value and content of the proximate principles and of calcium, phosphorus and iron. The majorty of these foods had not previously been analysed in India.

The vitamin A and carotene content of some 170 common foods was determined by the spectrographic method. Investigations were carried out on the effect of storage and other factors on carotene and vitamin C content. The interesting observation was made that in certain vegetable foods an increase of carotene might take place after harvesting.

The vitamin B_2 content of foodstuffs was under study by biological assay. This is of considerable interest since it has been discovered that one of the common food deficiency diseases in South India, stomatitis,—is caused by lack of one or more of the factors present in vitamin B_2 complex.

Attention was directed to the availability of minerals, *viz.*, iron and calcium, in various foods. Sufficient material was collected for practical application, and all available information about the nutritive value of Indian foods, together with accounts in simple language of the principles of nutrition, instructions how to devise "cheap balanced diets", etc., are being passed on to the public in "Health Bulletins".

(*ii*) *Food investigation (B_2 complex) by Dr. H. Ellis C. Wilson at the All-India Institute of Hygiene and Public Health, Calcutta.*—The quantitative estimation of Indian foods for the two factors of B_2 complex namely, flavin a fluorescent pigment and the anti-dermatitis (B_6) factor was undertaken during the year under review. The estimation of the flavin component was carried out on 26 foods by chemical analysis and biological assay. The former was found to be impracticable with all classes of foods. The estimation of the anti-dermatitis factor was done by biological assay on 15 foodstuffs. The chemical properties of this factor are not known, but it has been found to be present in large quantity in wheat germ and fish. The work is in progress.

(*iii*) *Enquiry on cheap balanced diets under the Bombay Presidency Baby and Health Week Association.*—The lines of investigation pursued during the year under report were (1) nutritional and (2) analytical and experimental. Experience showed that the non-vegetarian Balanced Diet as at present constituted required improvement in certain directions. The effect on nutritive value of Indian cooking methods was also the subject of study.

(*iv*) *Investigation of etiology and pathology of peptic ulcer in South India by Dr. Ian M. Orr.*—The high incidence of duodenal ulcer among the people of South India is apparently associated with the lack of vegetable and animal protein in their diet and possibly with a vitamin deficiency. The special tendency for the tapioca eaters of Central Travancore to ulcer formation is even more marked and the evidence so far obtained points to the conclusion that many of these people suffer from a chronic gastritis and duodenitis and the site of origin of these ulcers is where inflammed lymph follicles rupture on the surface of the mucosa. Evidence is available that changes take place in the nervous system due to defective diet. This work was still in progress.

Plague.

109. Plague research at the Haffkine Institute has been described in this Section on page 204, the investigations on the epidemiology of plague have been referred to in paragraph 15, Section II, and the main lines of the enquiry relating to the recrudescence of plague in the Cumbum Valley, Madras Presidency, under the Director of Public Health, in Section II on page 39.

Tuberculosis.

110. *Tuberculosis enquiry by Dr. Ukil at the All-India Institute of Hygiene and Public Health, Calcutta.*—A paper on "A Comparative Study of culture and animal inoculation as methods for isolating Tubercle bacilli from pathological materials" was published in the I. J. M. R. and another on the "extent and intensity of extreme ultra-violet radiation at Calcutta, with special reference to the therepeutic value" appeared in the November, 1936, issue of the Journal of the Indian Medical Association. Other studies included (*i*) tuberculosis immunity among Indians, (*ii*) transmission of infection from man to man and (*iii*) the incidence of some non-tuberculous diseases which simulate tuberculosis, *e.g.*, bronchiectasis.

Vaccines.

111. *Anti-rabic vaccine enquiry at the Pasteur Institute of India, Kasauli.*—During the year under review human and animal experiments were conducted (*i*) to test the value of immune serum in anti-rabic treatment and (*ii*) in connection with the antigenic properties of carbolised 5 per cent. vaccine, the virulence of the Paris strain of rabies fixed virus and the antigenic value of monkey brain anti-rabic vaccine.

Analysis of the treatment statistics of all Pasteur Institutes in India indicated that, following the complete decentralization of treatment, the figures, with the exception of those relating to the number of cases treated and the death rate, would not have the same value as before decentralization.

Miscellaneous.

112. (*i*) *Indigenous drugs enquiry under Bt.-Colonel R. N. Chopra, C.I.E., K.H.P., I.M.S., at the School of Tropical Medicine, Calcutta.*—The study of some of the inorganic preparations of indigenous medicines was continued and investigations on *Banga bhasma* (calcined tin) and *Lauha bhasma* (calcined iron) were completed and results published in the I. J. M. R. Crude oxides of tin were used in the old Hindu medicine in the treatment of skin diseases, and in view of the fact that there is a tendency for this metal to accumulate in the system, the observations made were interesting. It was noticed that workers in tin mines did not suffer from furuncles and, based on this observation, stannoxyl was introduced in the treatment of furunculosis.

A study of *Lauha bhasma* showed that the ancient Hindus appear to have possessed a more advanced knowledge of the uses of iron and that it was appreciated that iron preparations should be administered in an assimilable form *Swarna bhasma* (calcined gold) was under study.

(*ii*) *Indigenous drugs enquiry under Dr. Khem Singh Grewal at the King Edward Medical College, Lahore.*—The drugs studied included *Luffa acutangula* and *Nilumbium speciosum.*

(*iii*) *Statistical (urban) enquiry into the causes of maternal mortality and morbidity in child birth in India under Dr. Neal Edwards at the All-India Institute of Hygiene and Public Health, Calcutta.*—300 cases of maternal deaths were analysed. Associated diseases accounted for 16·6 per cent. and childbearing was directly responsible for 80·4 per cent.; 3 per cent. were unknown.

Sepsis caused the largest number of deaths in the child-bearing group 79 deaths or 32·7 per cent. Of these 59 per cent. followed normal labour of which 47 per cent. were delivered by *dais*. Anaemia appeared to be a contributing factor in 41 per cent. of the deaths from sepsis following normal delivery.

Toxaemias were responsible for 61 deaths (25·3 per cent.) in the child-bearing group (eclampsia 49, 20 per cent.). Primigravidae formed 69 per cent. of the eclampsia cases.

Anaemia *per se* caused death in 45 cases (18·6 per cent.) in the child-bearing group, and was present and probably contributed to the fatal issue in 99 (33 per cent.) others in the whole series of 300 cases. It was not found possible to obtain information regarding the forms of anaemia present. Haemorrhage, ante and post-partum, caused 34 deaths (14·2 per cent.) in the child-bearing group. Shock and accidents of labour caused 13 deaths or 5·4 per cent. Disproportion and difficult labour was found uncommon in Calcutta. Prenatal care was given in only 13·7 per cent. of the deaths due to child-bearing. A primary avoidable factor was present in 94·2 per cent. of the deaths directly due to child-bearing.

(*iv*) *Statistical (rural) enquiry into the causes of maternal mortality and morbidity in child-birth in India under the Assistant Director of Public Health, Delhi Province.*—It was arranged that *Chowkidars* in rural areas should report cases of maternal mortality to the sub-assistant surgeon in charge of the *thana* who would then fill up the forms. It was also decided that the Superintendent, Maternity and Child Welfare Section, New Delhi, should enquire into such cases as necessitated further investigation. Only 17 cases were reported.

(*v*) *Enquiry into anaemia of women under Dr. L. E. Napier at the Calcutta School of Tropical Medicine.*—The examinations carried out included haemoglobin estimation, cytological enumeration of red and white cells, cell count, coagulation time, the van den Bergh test, gastric analysis, urobilin estimation and examination of stools for ova. The results were analysed and papers were ready for publication.

(*vi*) *Helminthological enquiry under Dr. P. A. Maplestone at the School of Tropical Medicine, Calcutta.*—Monthly examination of the latex from fig trees was completed. This was done to find if any seasonal variation occurred in the chemical constitution of the sap. No alteration was found, but the amount of enzyme in the sap of the species examined was too small to give it any anthelminthic value.

The cysticercus commonly found in pigs was definitely proved to be the larva of *Taenia solium* by means of feeding experiments on a human volunteer. In view of the deficiency in the literature of this cyst a full study of this parasite was carried out and many specimens were used in compiling data for a full description.

(*vii*) *Drug addiction enquiry by Bt.-Colonel R. N. Chopra, C.I.E., K.H.P., I.M.S., at the School of Tropical Medicine, Calcutta.*—Studies on the effects of hemp drugs in all their common forms, *ganja*, *charas*, and *bhang* were carried out both in man and in laboratory animals. The water content in the blood of opium addicts, both before and after withdrawal, as well as during the course of treatment was also estimated. These investigations suggested new lines of treatment which were under trial.

(*viii*) *Medical mycology enquiry under Dr. P.A. Maplestone at the Calcutta School of Tropical Medicine.*—The work begun by the late Colonel Acton on *pityriasis rubra* was completed and published. During the year a series of cases was treated with apparently good results by a filtrate made from the

material taken from the lesions, in the same way that other diseases were treated in former years. A paper on favus was published during the year in the I. J. M. R. Work on this fungus and on an abnormal *microsporum* obtained from a school in Shillong was in progress.

(*ix*) *Dracontiasis and filariasis enquiry under Dr. Sundar Rao at the School of Tropical Medicine, Calcutta.*—The effect of gastric juice and of bile on cyclops infected with guinea-worm larvae was investigated and the results published in the I. J. M. R. Other studies included (1) the behaviour of cyclops to embryos of dracunculus and other parasitic nematodes, (2) experimental infection of laboratory animals with guinea-worm and (3) field investigations.

Attempts at experimental infection failed ; field studies proved that the dry season was the period most favourable for the transmission of infection. A paper on ' Filariasis in Patnagarh ' was published in the I. J. M. R. during the year. Several drugs were tried on filarial subjects in order to determine their influence, if any, on (*a*) the presence of microfilariae in the system and (*b*) the frequency of attacks of lymphangitis.

(*x*) *Filariasis enquiry under Dr. Bhaskara Menon, Royapuram Hospital, Madras.*—Investigations were carried out (*a*) on the possibility of transmission of filarial infection through water containing fully developed filarial larvae and (*b*) study of the percentage of cases of hydrocele which were filarial in nature. Haemotological examinations were made of six cases of clinical filariasis.

(*xi*) *Protozoal parasites enquiry under the Director, King Institute, Guindy, Madras.*—The work included (1) experiments with *Leishmania donovani* found in the natural excretions and secretions of Kala-azar patients, (2) collection and identification of sandflies from Madras city and the surrounding areas, (3) tick fever of dogs due to *Babesia gibsoni*, (4) observations on the morphology of *B. gibsoni* in the internal organs and the circulating blood of dogs and (5) attempts to cultivate the plant flagallate *Phytomonas davidi*. Three papers were published in the I. J. M. R.

(*xii*) *Statistical enquiry under the Public Health Commissioner with the Government of India.*—The compilation of weekly figures of reported attacks and deaths during 1935 from cholera, small-pox and plague in all provinces was completed. Maps showing the known distribution of yellow fever in Africa ; air routes in India ; and the malarious areas in Delhi were prepared.

(*xiii*) *Cancer enquiry by Dr. Vishwa Nath at the King Edward Medical College, Lahore.*—The work on this subject was further pursued and the data collected were under analysis along previous lines. A fuller account of this enquiry has been given in Section II of this report (page 89).

(*xiv*) *Typhus enquiry by the Director, Pasteur Institute of India, Kasauli.*—The examination of ectoparasites collected from over 1,000 wild rats out of a total of 2,500 trapped during the year was completed ; results were under preparation for publication. Studies were carried out on (*a*) *Xenopsylla cheopis XK* type of typhus, (*b*) *Weil-Felix* reaction in wild rats ; and (*c*) *B Proteus* from rats. Other work included experiments with the X19 type of typhus and isolation of typhus strains from human sources. During the year three papers were published in the I. J. M. R.

(*xv*) *Tick typhus enquiry under the Director, King Institute, Madras.*—This enquiry was undertaken to (*a*) determine the serological types of human typhus in South India, (*b*) investigate the vertebrate reservoirs in nature, (*c*) search for the arthropod vector or vectors, and (*d*) attempt the cultivation of the virus of the disease in artificial media on chorio-allantoic membrane and in flask cultures using embryonic tissue. The work was still in progress.

(*xvi*) *Enquiry into snake venoms and the production of antivenene under the Director, Central Research Institute, Kasauli.*—Studies on the action of snake venoms were carried out during the year. Interesting results were obtained in connection with their haemolytic properties and these were embodied in eleven papers published in the I. J. M. R. A fuller account of this work has been given in the portion relating to the Central Research Institute, Kasauli.

(*xvii*) *Enquiry in trachoma (the cultivation of filtrable viruses) under the Director, King Institute, Madras.*—Sheep-pox virus was successfully cultivated on the chorio-allantoic membranes of developing chick embryos. The cultured virus was found to have lost its generalising properties in sheep. Work to assess the nature and value of lesions obtained on chorio-allantoic membranes and to study the effect of B. proteus X19 on inoculation into egg membranes was also under progress.

(*xviii*) *Bacteriological investigations by blood culture in certain eye diseases under the Dean, Seth G. S. Medical College, Bombay.*—Some eye diseases such as phlyctenular conjunctivitis, episcleritis, interstitial keratitis and vitreous haemorrhage are known to be both chronic and recurrent. With a view to throw light on their etiology, haemoculture experiments were under progress.

(*xix*) *Enquiry into the etiology of splenomegaly in Bengal by Dr. M. N. De at Medical College, Calcutta.*—The aim of this enquiry was to find out the causes and nature of the splenic enlargements so commonly met with in Bengal in which the patients show no evidence of malarial or leishmania infection. The work was in progress.

(*xx*) *Epidemic dropsy enquiry under the Directors, School of Tropical Medicine and All-India Institute of Hygiene and Public Health, Calcutta.*—This enquiry was developed along two main lines (1) study of patients suffering from epidemic dropsy and (2) search for evidence implicating rice or other articles of diet in the causation of the disease. The results obtained seemed to indicate the existence of an infective agent and that the infective process produces in the initial stages varying degrees of intestinal disturbances leading in most cases to change in the intestinal bacterial flora. A study of rice samples and two field investigations were carried out during the year. The collected data was analysed with a view to test the validity or otherwise of the three important theories of epidemic dropsy, *viz.*, (*a*) the rice theory, (*b*) the mustard oil intoxication theory, and (*c*) the contact infection theory. It was noted that age and economic status are factors associated with the incidence of this disease. It was also found that epidemic dropsy was chiefly a disease of the middle classes and that Bengalis and others who have adopted their habits of living were the worst sufferers. This was demonstrated in a part of Calcutta where Bengalis and non-Bengalis of more or less the same economic status lived side by side. The work was in progress.

(*xxi*) *Kala-azar enquiry under the Director, School of Tropical Medicine, Calcutta.*—Two new antimony compounds were each tested on a few cases. In neither were the results satisfactory. A series of hamster infection experiments were all negative. The enquiry was still under progress.

(*xxii*) *Histopathology of mycetoma or 'Fungus foot disease' under the Dean, Seth G. S. Medical College, Bombay.*—Mycetoma or 'Fungus Foot Disease', although relatively common in India, is met with more often in rural population. As regards sex incidence it was found that this disease was more common in men than in women. The investigation was not completed during the year under review.

SECTION IX.

MEDICAL INSTITUTIONS.

Hospitals and Dispensaries.

113. For statistical and other purposes, medical institutions in India are classified as follows :—Class I—State, public ; Class II—State, special ; Class III—Local, municipal fund and subsidised dispensaries ; Class IV—Private, aided ; Class V—Private, non-aided ; and Class VI—Railways.

At the end of 1936, the number of hospitals and dispensaries of all classes totalled 6,935, of which only 565 or 8 per cent. were controlled by private organisations, all others being maintained wholly or in part by Governments, municipal and district boards and railways. Table IX (*i*) gives the numbers of institutions by classes in the different provinces and the average population served per institution. Table A, Appendix VIII, gives their distribution in rural and urban areas and the populations served by each.

TABLE IX (*i*).

Hospitals and dispensaries.

	Classes I, III and IV.		Classes II and VI.		Class V.		Total.		Average population served per institution, 1936.
	1935.	1936.	1935.	1936.	1935.	1936.	1935.	1936.	
British India	5,382	5,495	857	840	551	564	6,790	6,899*	41,063
N.-W. F. P.	71	66	36	25	11	11	118	102*	24,440
Punjab	782	784	170	169	7	8	959	961	26,594
Delhi	26	27	2	2	...	...	28	29	23,048
U. P.	503	502	112	111	83	78	698	691	74,781
Bihar	454	454	69	65	63	67	586	586	58,521
Orissa	148	150	18	18	10	10	176	178	40,222
Bengal	1,047	1,116	119	123	177	176	1,343	1,415	36,519
C. P.	232	235	53	53	43	52	338	340	48,583
Bombay	325	327	62	62	39	39	426	428	44,741
Sind	144	149	12	12	12	12	168	173	24,305
Madras	1,166	1,194	77	76	90	94	1,333	1,364	34,123
Coorg	11	11	...	...	...	...	11	11	14,973
Assam	214	218	46	48	8	8	268	274	30,498
Burma	226	228	71	66	4	4	301	298	42,980
Baluchistan	33	34	10	10	4	5	37	49	...

* Excluding 36 dispensaries in the Agencies.

It will be observed from this table that on an average each institution served approximately 41,000 persons. Provincial figures, as might be expected, varied widely from the average, being only 15,000 in Coorg and as high as 75,000 in the U. P., but a more illuminating view of actual conditions can best be obtained from examination of urban and rural figures. Whilst the average population served by each institution in urban areas reached the maximum of 20,000 in Delhi Province, the corresponding number for rural areas was as high as 124,000 in the U. P. and 104,000 in Bombay Presidency. These figures indicate the urgent need for extension of rural medical relief. This subject has received considerable attention from various provincial governments within recent years as is evidenced by the establishment of additional rural dispensaries, the provision of subsidies for medical practitioners prepared to settle in the larger rural villages and the establishment of travelling dispensaries. By one method or another, it is necessary to obtain a wider distribution of qualified medical men throughout the country, if medical relief is to be readily available to the average rural villager.

The number of beds available for accommodation of in-patients increased to 76,767 for all classes of institutions, of which 14,810 existed in State-special, railway and private non-aided institutions and 61,957 in State-public, local fund and private aided hospitals and dispensaries. Accommodation reserved for female patients was 26 per cent. less than that for males. Table B, Appendix VIII, gives details of beds in the different provinces.

With an increase in the available number of hospitals and dispensaries the total number of patients treated also rose from 78,453,164 in 1935-36 to 80,922,420 during the year under review. Of this increase, the greater proportion was amongst women and children, an indication that the advantages of hospital treatment are becoming better understood by the female sections of the community. As was remarked in last year's report, in Madras Presidency alone are the numbers for male and female attendances at hospital approximately identical. Table IX (*ii*) shows the numbers of patients treated in hospitals and dispensaries.

TABLE IX (*ii*).

Patients treated.

	Classes I, III and IV.			All Classes.		
	Indoor.	Outdoor.	Total.	Males.	Females and Children.	Total.
British India	1,243,853	70,455,659	71,699,512	50,488,331	30,434,089	80,922,420
N.-W. F. P.*	33,454	2,122,975	2,156,429	1,809,174	705,708	2,514,882
Punjab	213,766	14,430,653	14,644,419	9,531,514	6,536,686	16,068,200
Delhi	20,322	1,221,252	1,241,574	771,838	505,564	1,277,402
U. P.	133,140	8,191,580	8,324,720	6,896,639	3,118,076	10,014,715
Bihar	77,044	5,198,848	5,275,892	4,568,182	2,056,306	6,624,488
Orissa	15,326	1,700,899	1,716,225	1,272,264	575,235	1,847,499
Bengal	130,533	7,958,933	8,089,466	7,273,226	3,248,552	10,521,778
C. P.	42,079	3,290,213	3,332,292	2,578,496	1,286,608	3,865,104
Bombay	105,869	2,757,138	2,863,007	2,181,010	1,316,260	3,497,270
Sind	31,235	857,868	889,103	555,174	333,929	889,103
Madras	262,331	16,325,356	16,587,687	8,436,722	8,245,807	16,682,529
Coorg	6,281	315,265	321,546	215,172	106,374	321,546
Assam	20,401	2,164,916	2,185,317	1,754,874	677,562	2,432,436
Burma	140,809	3,258,146	3,398,955	2,146,620	1,545,868	3,692,488
Baluchistan	11,263	661,617	672,880	497,426	175,554	672,980

*Including Agencies.

Special women's hospitals are still few in number and are ordinarily to be found only in district headquarter towns and other large urban centres. They number in U. P. 82, in the Punjab 40, in Madras 42, in C. P. 12, in Bengal *mufassal* 12, in Calcutta six, in Bombay presidency 14, in Sind eight, in Bihar five, in N.-W. F. P. four, in Burma three and in Assam one. Facilities for the treatment of women are, however, also available in most hospitals and dispensaries.

Table C, Appendix VIII, gives the numbers of beds for women in general and special hospitals and numbers of patients treated.

The medical personnel employed in the different provinces comprised I.M.S. officers 189, W. M. S. officers 32, I. M. D. 93, salaried graduates or M.B., B.S. 1,909 and licentiates 7,013. Provincial figures are given below.

TABLE IX (*iii*).

Medical Personnel.

	I. M. S.	W. M. S.	I. M. D.	Salaried graduates.	Salaried Licentiates.
Total	189	32	93	1,909	7,013
N.-W. F. P.†	13	2	6	26	110
Punjab	20*	..	17	190X	931
Delhi	2	10	4	29	35
U. P.	18	11	4	225	608
Bihar	14	1	1	163	626
Orissa	1	..	2	30	184
Bengal	23	..	9	443	1,568
C. P.	8	6	3	98	335
Bombay	16	..	6	208	426
Sind	2	..	4	39	162
Madras	34	1	..	316	1,331
Coorg	..	..	..	1	15
Assam	12	1	4	47	290
Burma	21	..	3	91	373
Baluchistan	5	..	30	3	19

†Including Agencies.

The practice of appointing selected private medical practitioners as honorary physicians and surgeons in Government hospitals continued to increase and during 1936 a total of 750 medical graduates and 287 licentiates were so engaged, most of these giving their services in Provincial and District headquarter hospitals. Provincial figures are given in Table IX (*iv*) below.

TABLE IX (*iv*).

Honorary Medical Staff.

	Graduates.	Licentiates.
Total	750	287
N.-W. F. P.	1	..
Punjab	17	6
Delhi	2	1
U. P.	44	19
Bihar	15	10
Orissa	..	1
Bengal.	271	126
C. P.	20	4
Bombay	192	16
Sind	7	2
Madras	149	79
Coorg	..	2
Assam	5	4
Burma	27	17
Baluchistan	..	..

Nursing staffs continued to remain far short of actual requirements in every province, particularly in rural institutions. Whilst in-patients totalled 1,243,853 in state-public, local fund and private aided institutions, the total number of nurses employed was only 4,309. Table IX (*v*) gives the numbers employed in rural and urban areas and figures of expenditure.

*Excluding four officers in special posts.
X Excluding a number in special posts.
I. M. S.—Indian Medical Service.
W. M. S.—Women's Medical Service.
I. M. D.—Indian Medical Department.

TABLE IX (*v*).

Number of nurses and expenditure on nursing.

	No. of nurses.			Expenditure on nursing.	
	Rural.	Urban.	Total.	Total.	Per case treated.
				Rs.	Rs. A. P.
Total . . .	332	3,977	4,309	39,69,676	3 3 1
N.-W. F. P. . .	..	71	71	39,212	1 2 9†
Punjab . .	5	339	344	3,18,758	1 7 10
Delhi . . .	..	198	198	2,04,068	10 0 8
U. P. . . .	30	334	364	2,43,290	1 13 3
Bihar . . .	52	202	254	1,30,863	1 11 2
Orissa . . .	6	34	40	34,030	2 3 6
Bengal . . .	16	678	694	6,98,548	5 5 7
C. P. . . .	26	144	170	31,310	0 11 11
Bombay . .	18	660	678	5,80,935	5 7 10
Sind . . .	4	116	120	94,753	3 0 6
Madras . . .	108	680	788	9,29,120	3 8 8
Coorg . . .	4	4	8	8,739	1 6 3
Assam . . .	14	32	46	1,04,890*	*5 2 3
Burma . . .	49	472	521	5,44,739	3 11 11
Baluchistan . .	..	13	13	6,421	0 9 1

*Including expenditure on compounders. †Including Agencies

In the Punjab, 233 women qualified for the indigenous dai's certificate, 66 for the nurse dai's certificate and 45 for the diploma in midwifery of the Punjab Central Midwives Board. The Punjab Branch of the Countess of Dufferin Fund did valuable service in the promotion of female medical aid by giving scholarships to students undergoing training for the various qualifications. The Punjab Nurses Registration Council also did useful work in the same sphere in that it stimulated women to obtain registrable qualifications and discouraged practice by unqualified *dais*.

The following table giving figures for 1935 and 1936, shows that in only a few of the hospitals in Calcutta were the nursing staffs slightly strengthened and it is probably still correct to say that in no institution was the number of nurses nearly sufficient to cope with the work :—

	1935.	1936.
Medical College hospitals	180	182
Presidency General hospital	98	99
Mayo Hospital	10	12
Carmichael Medical College Hospital, Belgachia	68	72
Calcutta Medical School Hospital	30	44
Lady Dufferin Victoria Hospital	44	56

In the Campbell Hospital the nursing arrangements continued to be very inadequate and, in an attempt to improve the position, a scheme for providing a training centre for Indian nurses was worked out and submitted to Government. A scheme for the recruitment of Indian ladies to the nursing staff of the Medical College Hospitals was sanctioned and widely advertised by Government.

In the *mofussil* institutions of Bengal Presidency, conditions remained almost the same as in the previous year except that at the Jalpaiguri *Sadar* Hospital 11 new nurses including four probationers were recruited. In addition trained nurses were available in 11 *sadar* hospitals, but their number in any one institution was quite inadequate. Schemes for the improvement of nursing in four *sadar* hospitals were under consideration. In all other institutions, except those administered by Christian Medical Missions, nursing was carried out by untrained male or female attendants, *dais*, midwives and ward servants.

The training centres for nurses in Bengal Presidency were as before and 36 pupils passed the examination for the Senior and 28 for the Junior Certificate. The total number of registered nurses at the end of 1936 was 967 as against 887 at the end of 1935.

The Bengal Nurses' Registration Act came into force in February, 1934, and the Nursing Council was constituted in March 1936. Rules and regulations were framed and submitted to Government for sanction. It is hoped that the Council will be able to assist in solving the nursing problem in Bengal.

In C. P. additional nurses comprising two nursing sisters, four staff nurses and one probationer were sanctioned during the year, but hospital nursing staffs were still generally inadequate. A Nurses' Home at the Irwin Hospital, Amraoti, was nearing completion and should be a great improvement. The three probationer training centres were continued at the Mayo Hospital, Nagpur, the Victoria Hospital, Jubbulpore, and the Irwin Hospital, Amraoti, but no training class at Raipur was held for want of applicants.

In Assam the trained European nursing sisters attached to the civil hospitals at Gauhati and Dibrugarh continued to render useful service.

In Burma, there was an increase in the number of nurses employed, but lack of funds prevented further recruitment.

A total of 2,638,780 principal and 101,460 secondary operations were performed in state-public, local fund and private-aided institutions. Table D, Appendix VIII, gives numbers by provinces.

Out of a total expenditure of Rs. 4,04,41,492 on the maintenance of state-public, local fund and private-aided hospitals and dispensaries, Rs. 1,94,99,584 came from Government and Rs. 1,52,99,169 from municipal and local funds. Of the total Rs. 1,01,45,967 were spent on the employment of medical officers, Rs. 39,69,676 on nurses, Rs. 32,91,571 on diet and Rs. 50,68,060 on medicines. Tables E and F, Appendix VIII, give figures of income and expenditure for individual provinces.

Details in regard to malaria, influenza, kala-azar, diphtheria, typhus fever, dysentery, hook-worm, guinea-worm and venereal diseases have already been given in Section II of this report. Provincial reports should be consulted in regard to the figures for other diseases.

In the N.-W. F. P., a remarkable increase in the activities of the medical department is reported to have occurred during the last six years. During this period the annual total number of persons treated has increased by nearly 63 per cent ; in 1931 it was 1,319,867 and in 1936 it reached the large figure of 2,156,429. This increase has been general throughout the province and the figures for indoor and outdoor patients have increased 28 per cent. and 64 per cent. respectively as compared with the figures for 1931.

As a further attempt to reduce the high rate of infantile mortality in this province, a provincial *dai* training centre was opened in Peshawar in addition to that already existing at Dera Ismail Khan. During the year under report, 13 *dais* from Peshawar and Hazara districts received training at the new centre. Peripatetic dispensaries were instituted and dispensary medical officers, when other duties permitted, were ordered to visit neighbouring villages once or twice weekly. The total number of patients treated was 85,997 ; the total number of patients treated in travelling motor dispensaries was 93,983.

During the year under report 11,261 cases of tuberculosis of lungs and 7,519 cases of tubercular diseases received treatment in hospitals and dispensaries in N.-W.F.P. as against 3,837 and 3,000 respectively during 1931. As these figures probably represent only a proportion of the total number of persons suffering from this disease, it is evident that tuberculosis has been and is on the increase. No sanatorium or tuberculosis hospital exists in the province, but accommodation for 30 beds was provided during the year in the " Brierley Memorial Tuberculosis Ward " and a 10-bed ward for females and children suffering from the disease was under construction. Tuberculosis clinics were opened at 34 hospitals.

In the Punjab, no further hospital was provincialised during the year, but the activities of the medical department continued to expand. Available in-patient hospital accommodation open to the public was increased by 342 beds, of which Jullundur district alone claimed 148. The scheme of subsidised dispensaries was on trial. The number of patients treated increased by 7,85,000 as compared with the previous year. Owing to heavier rains, malaria was more prevalent, accounting for an increase of 1,48,000. The Rai Bahadur Amar Nath Tuberculosis Institute as a self-contained unit for the treatment of tubercular patients made a valuable contribution to the anti-tuberculosis campaign in Lahore.

A considerable increase occurred in the number of women patients both indoor and outdoor, and the problem of providing more adequate medical aid for women is important, in view of the growing demand. Separate women hospitals exist only in a few district headquarters ; in some centres women sub-assistant surgeons are incharge of women's sections attached to the main hospitals, but in nearly two-thirds of the *tehsil* headquarters hospitals and dispensaries no arrangements exist for the treatment of women patients by women doctors. Even although medicine as a profession is increasingly popular among educated girls, owing to lack of accommodation in the medical colleges it has not been possible to admit many of the women applicants and it will be many years before sufficient qualified women doctors are available to permit of a wide expansion of medical relief to women by members of their own sex.

In Delhi, the municipal committee maintained 11 hospitals, including a hospital for tubercular patients and a tuberculosis clinic ; five dispensaries were maintained by the district board ; and five were private-aided hospitals. There were also four State-public hospitals, including the Irwin Hospital the construction of which was completed in April, 1936. Accommodation exists in this hospital for 320 patients, including 20 family wards and 10 special wards, one of which is for children.

In the U. P. the scheme for the training of doctors in X-ray work was still under the consideration of Government. The post-graduate course for provincial medical service officers was not held during the year. No selection board for recruitment to the provincial medical service was held, but the cadre was increased by one due to the opening of a new tuberculosis clinic in the

Colvin Hospital, Allahabad. The U. P. State Medical Faculty, introduced bi-annual examinations for the L.S.M.F. and an improved syllabus for the primary, intermediate and final examinations. The examination for the M.S.M.F., which was introduced as an experimental measure, was extended for a further period of three years. A scheme for the training of male nurses was engaging the attention of the Faculty; nursing facilities in *sadar* and women's hospitals were generally inadequate. The appointment of honorary physicians, surgeons and dentists was encouraged and the number of subsidised dispensaries and subsidised medical practitioners increased during the year as Government sanctioned a supplementary grant for this purpose. The rate of subsidy was raised from Rs. 600 and Rs. 400 to Rs. 1,000 and Rs. 600 for private medical practitioners holding M.B., B.S. and L.S.M.F. degrees respectively; the revised rates seemed to attract a larger number of doctors.

In Bihar, a special grant for treatment of venereal diseases was distributed as in previous years to *sadar* and sub-divisional hospitals. The Government grant for kala-azar treatment was increased from Rs. 10,000 to Rs. 20,000 and distributed to *sadar* and sub-divisional hospitals as well as to rural dispensaries. Tuberculosis patients were treated in the Itki sanatorium in addition to the ordinary hospitals and dispensaries. A scheme for organising the treatment of tuberculosis all over the province was drawn up, the object being to open tuberculosis clinics at every district headquarters. Decentralisation of anti-rabic treatment received further attention and Government sanctioned the opening of anti-rabic clinics at the various *sadar* hospitals.

In Orissa, which became a separate province on 1st April, 1936, the control of medical, public health and prison services was combined under one administrative head. The number of dispensaries in the province was considered insufficient for the medical needs of the people and the provision of additional facilities by inducing private practitioners through the payment of subsidies to settle in important rural centres was under consideration by Government. Special grants for the treatment of venereal diseases were given to *sadar* sub-divisional and other important hospitals. Arrangements were made with the Government of Bihar for the treatment of patients suffering from tuberculosis and mental diseases at the Itki Sanatorium and the Mental hospital at Ranchi.

As regards Bengal, 47 institutions provided for the needs of the people in Calcutta, 22 of these treating outpatients only and the others dealing with both out- and in-patients. The total number of beds increased from 3,723 to 4,018 of which 2,360 were for males and 1,603 for females. The number of cases treated also increased from 976,216 in 1935 to 1,059,650, these comprising 77,226 in-patients and 982,424 out-patients. In the *mofussil*, 1,369 hospitals and dispensaries, of which 1,102 were in rural and 267 in urban areas, provided 6,276 beds, 4,606 for males and 1,670 for females. In addition, 340 treatment centres were opened temporarily in certain districts by the district board authorities to meet emergencies and especially for the treatment of malaria, kala-azar and leprosy. In three other centres, medical aid was provided for persons attending *hats*, *melas* and fairs. The number of patients who received treatment in all classes of hospitals and dispensaries, including medical centres, totalled 9,834,122 as against 9,763,467 in 1935.

The daily average number of indoor patients increased by 130 in Calcutta and by 140 in the *mofussil* whilst the corresponding increases in the outdoor departments were 108 and 1,910 respectively. The continued increase in daily attendances at both urban and *mofussil* institutions afforded evidence of their growing popularity. X-ray installations were available in 15 *mofussil*

hospitals as compared with 12 in 1935. There is little doubt that the opening of X-ray departments, maternity, eye, ear, nose and throat clinics particularly in the rural hospitals has served to meet a great want. In order to facilitate the development of these special clinics and departments without laying an impossible burden on Government and local authorities, the Government approved of a scheme under which competent private medical practitioners should be employed in an honorary capacity. In addition, the Public Health and Medical Departments worked out a scheme for setting up an organisation throughout the province for the provision of medical relief in combination with public health work. This scheme envisaged the provision of one treatment centre for every two union boards and of a medical officer for a group of every four union boards, funds to be provided partly by Government and partly by local bodies ; its ultimate object was to have a treatment centre for each union board. As rural areas are naturally less attractive to qualified medical practitioners than the towns, a proposal that practice in a rural area for a period of not less than three years should be made a condition precedent to recruitment in Government medical service was under the consideration of the Provincial Government.

In the Central Provinces, the average dispensary serves an area of about 467 square miles and a population of about 72,466. On an urban and rural basis, however, the average numbers served are 16,000 and 127,000 respectively. The latter figure indicates the great need for a wide expansion of medical relief, but the financial position during 1936 prevented additional expenditure in this direction. Medical personnel numbered 1,166, of which 129 were in hospitals and dispensaries at provincial headquarters, 705 in institutions at district headquarters and other urban areas and 332 in rural areas. Independent medical practitioners continued to hold honorary appointments as physicians, surgeons, dentists and specialists in the eye, ear, nose and throat departments at the Mayo Hospital, Nagpur, the Victoria Hospital, Jubbulpore, the Irwin Hospital, Amraoti the Silver Jubilee Hospital, Raipur, and the Main Hospital, Akola. An honorary dentist was also appointed to the Main Hospital, Khandwa. Indoor and outdoor patients treated in all classes of medical institutions numbered 55,751 and 3,809,353 respectively.

Anti-rabic treatment was as before carried out at the existing six centres ; a new centre was opened at the Main Hospital, Wardha.

In Bombay Presidency, the new hospital at Thana, completed at a cost of about Rs. 2 lakhs, was formally opened in May 1936. Other improvements included the addition of a leprosy clinic at Dhulia Civil Hospital and the installation of an X-ray apparatus for ultraviolet radiation treatment and electric therapy at the Belgaum Civil Hospital. Further decentralisation of anti-rabic treatmnet was recommended and the opening of treatment centres at nine hospitals was sanctioned by Government. After examining several alternative schemes for the extension of medical relief to rural areas, the Government decided to try the following experimental schemes :—

(1) Subsidising private medical practitioners in certain selected districts on condition that they practised in the rural areas of those districts.
(2) Increasing the number of qualified nurses and midwives attached to local board dispensaries.
(3) Opening of tuberculosis clinics in important towns.

Six districts were selected for a trial of the first scheme, under which private medical practitioners were each given Rs. 50 per mensem as a fixed travelling allowance and medicines and instruments up to a maximum value of Rs. 400

per annum. Each subsidised practitioner would be in charge of three or four villages easily accessible by road or rail and he would be required to visit these villages on definite days each week. Under the scheme, half the cost was chargeable to district boards and half to Government.

As regards the second scheme, Government has undertaken to pay to each district board a subsidy equal to one third of the cost of nurse-midwives, subject to a maximum of three, maintained by the board in addition to those at present in service at its dispensaries. In special cases where properly qualified women are not available, the district board is allowed, at the discretion of the Surgeon-General, to engage qualified midwives as a temporary measure. Several district local boards having expressed their willingness to participate in the scheme, they have been asked to appoint nurse-midwives at their dispensaries as soon as possible.

In respect of the third scheme, the Government have sanctioned, as an experimental measure, the establishment of tuberculosis clinics at six civil hospitals. These clinics are to be in charge of honorary medical officers who will receive an honorarium of Rs. 50 per mensem. To each clinic will also be attached a qualified nurse on Rs. 100 per month with a house rent allowance of Rs. 15. The Bombay Provincial Branch of the Indian Red Cross Society has agreed to bear half the cost of the salaries and allowances of the nurses ; the remaining expenditure will be borne by Government.

Sind was constituted a separate province on 1st April, 1936. In this new province, the total number of institutions open on the last day of 1936 was 173. During the year, the number of in-patients treated totalled 31,235 and out-door patients 857,868. As regards rural medical relief, the Government at present contribute 40 per cent. of the cost of 38 dispensaries which are under the control of the District Local Boards, 40 per cent. of the cost of 20 municipal dispensaries and 84 per cent. of the cost of district headquarter hospitals. As a result of the development of the Llyod Barrage scheme, additional dispensaries were required in areas served by the new canals. A great demand exists for trained nurses and for skilled assistance for midwifery cases and although a number of nurses are trained at the civil hospital and the Lady Dufferin Hospital in Karachi and numbers of *dais* are also given training at the Zenana Mission Hospital in Hyderabad, the numbers of trained women are still insufficient. In two districts maternity homes have been opened in most of the taluka headquarters' villages, but in other districts these are few in number. Government medical officers have instructions to assist the *dais* whenever necessary and possible. Some of the district local boards have subsidised practitioners in order to induce them to open dispensaries in rural areas.

In Madras presidency, at the end of the year under review medical institutions numbered 1,364, of which 1,118 were in rural and 246 in urban areas. Arranged according to class, 191 were state-public, 28 state-special, 517 local and municipal funds, private-aided 67, private non-aided 94, railways 48 and subsidised rural 419. The daily average attendance of in-patients rose to 11,641 as compared with 11,244 during 1935 and the need for additional beds was keenly felt in many of the hospitals. The system of appointing honorary medical officers to the staffs of Government institutions was extended. Thirty four new anti-rabic treatment centres were opened and two medical officers were trained in the technique of anti-rabic treatment.

With the opening of six new dispensaries in Assam, the total number of medical institutions rose to 274. In these institutions, 1,746 beds were available, including 1,301 for males and 445 for females. Notwithstanding financial stringency, a number of hospital improvements was effected. The question of

prevention of tuberculosis was given special attention and propaganda in the form of special lectures, demonstrations and literature was carried out by the medical and public health departments. One sub-assistant surgeon and two local board doctors attended the post-graduate refresher course at Sylhet.

In Burma, hospitals and dispensaries at the end of 1936 numbered 298 as compared with 301 at the end of 1935. The number of patients treated totalled 3,692,488, of which no fewer than 412,232 were suffering from malaria. During the year one subsidised medical practitioner was appointed and a new hospital was opened at the Rural Uplift Centre at Tatkon. Leprosy survey work was continued and further leprosy clinics were established. The proposal to establish a tuberculosis sanatorium in Burma could not be brought into force owing to lack of funds.

Mental Hospitals.

114. The average strength of patients in 19 hospitals stood at 10,353 during the year, although accommodation was provided for 9,476 patients only. In the U. P., Bihar, Sind, Assam and Burma, the average strength was below the accommodation provided and, in four of these five provinces, the maximum number confined on any one day also fell below the authorised accommodation; the indications, therefore, were that overcrowding did not exist. Of the mental hospitals in the remaining four provinces which maintain such institutions, serious overcrowding existed in those in Bombay and Madras Presidencies but in those of the Punjab and C. P. the average strength only slightly exceeded the available accommodation. In the Madras Mental hospital, accommodation was provided for 744 patients, but the maximum number confined on any one day reached the high figure of 1,433. In order to relieve to some extent the serious overcrowding, the Madras Government approved of an extension providing for 144 additional patients,—60 beds for males and 84 for females. Proposals for the construction of an additional block in the Waltair Mental Hospital to accommodate 18 female patients were also under consideration by the Madras Government. In Bombay Presidency, where overcrowding has been common to nearly all the mental hospitals, accommodation at the Yeravada Central mental hospital will be increased by 250 beds on the completion of an expansion scheme now under progress; proposals for increasing accommodation at the Ahmedabad mental hospital by 100 beds and at the Dharwar mental hospital by 28 beds, have also been approved by Government. Tables G and H, Appendix VIII, furnish details regarding accommodation available in the mental hospitals of different provinces, the maximum number of patients confined on any day, population and average strength.

Table H, Appendix VIII, gives the numbers of deaths recorded in the mental hospitals of the individual provinces. In the U. P., the number of deaths rose from 96 in 1935 to 107 in 1936. About 40 per cent. of the increase in mortality in one of the mental hospitals in the province was due to tuberculosis and ankylostomiasis. Amongst the main causes of sickness in Bihar were tuberculosis of the lungs and general debility. Of the 38 deaths recorded in Nagpur Mental Hospital during the year only two were due to tuberculosis of the lung. In Bombay Presidency, an increase in the death rate at the Thana Mental Hospital was recorded, this being due to dysentery of a virulent type. The chief causes of deaths in the other mental hospitals included dysentery, tuberculosis, pneumonia and malaria. Total deaths in the Sind mental hospitals numbered 23 and a high proportion of these was due to tubercular diseases of different kinds. The mortality rates in Madras

Presidency showed a decrease, the chief causes of death being tuberculosis, diseases of the nervous system and diseases of the circulatory system. In Assam, dysentery and tuberculosis together accounted for 32 out of a total of 42 deaths. Enquiry showed that defective water-supply was largely responsible for the high mortality and the urgent desirability of providing an adequate and satisfactory water-supply was stressed. Total deaths in Burma mental hospitals were 75.

Table I, Appendix VIII, gives details regarding the types of insanity treated in the provincial mental hospitals. The principal types in order of frequency were schizophrenia, including dementia praecox, mania, melancholia and manic depressive insanity.

Table J in the same appendix furnishes details relating to the causes of insanity amongst cases treated in the mental hospitals. Amongst the different causes domestic worry comes first; the others in order of frequency were hereditary pre-disposition, *cannabis indica*, business worry and syphilis.

Admissions to mental hospitals numbered 2,936 including 2,258 males and 678 females, the age-group 20-40 years including most of the cases. Details of admissions by age-groups and by communities in different provinces are given in Tables K and L, Appendix VIII.

Expenditure on mental hospitals totalled Rs. 38,03,677, including Rs. 9,00,276 on diet, Rs. 1,33,653 on bedding and clothing and Rs. 13,031 on medicines. Details by provinces are given in Table M, Appendix VIII.

In most of the mental hospitals, arrangements for water supplies were of a satisfactory nature, but at Ratnagiri the supply was insufficient, and at Dharwar, the municipal piped supply was unfit for drinking purposes. In addition both at Calicut and at Waltair, the hospital water supplies were insufficient during the hot weather months and similar defects were reported from the Assam mental hospital at Tezpur and the Tadagale hospital in Burma.

Medical Colleges.

115. Medical colleges number ten, two each in the Presidencies of Bengal, Bombay and Madras and one each in the Punjab, Delhi, U. P. and Bihar, Whilst the college in Delhi is exclusively for women, female students are also admitted to the others.

During the year, 56 of the 154 final year students in the King Edward Medical College, Lahore, passed the final M.B., B.S., examination; of the students from the Lady Hardinge Medical College in Delhi 12 out of 16 passed part A and 13 out of 21 passed part B of the final examination; 74 out of 108 passed part I and 43 out of 82 passed part II at the King George's Medical College at Lucknow; and 32 out of 55 passed part I and 39 out of 88 passed part II in the Prince of Wales' Medical College at Patna.

Seventy-three out of 174 students passed the final M.B., B.S examination at the Medical College in Calcutta. In the membership Medical Faculty final examination (new regulations) 8 passed out of 14; in part I (old regulations) 11 passed out of 15. Sixty-four students passed the final M.B. examination from the Carmichael Medical College, Belgachia. Passes in the Final M.B., B.S. examination in Bombay included 68 males and 14 females in group A and 55 males and 15 females in group B among students from the Grant Medical College and a total of 60 among students from the Seth Gordhandas Medical College. In addition, two obtained the M.D., one the M.S., two the B. Hy. part I, two the B. Hy. part II, five the B.Sc., and one the L.C.P. & S.

In the Madras Medical College 88 students out of 265 passed the final M.B., B.S., part II ; 25 out of 28 passed part I and 32 out of 50 part II from the Vizagapatam Medical College.

Medical Research.

116. As in previous years, a considerable amount of research work was carried out at different medical colleges and the following paragraphs give a brief summary of this important activity of the medical teaching institutions.

Investigations carried out by members of the staff of the King Edward Medical College at Lahore included (1) the pharmacological actions of indol-N-methylharmine ; (2) actions of kurchicine, an alkaloid of *nollarhena anti-dysentrica* ; (3) the pharmacological actions of conessine and iso-conessine ; (4) rheumatism and heart diseases in the Punjab ; (5) nitrous oxide and oxygen anaesthesia for major surgery ; (6) *Luffa acutangular*,—its chemical and pharmacological properties ; (7) cancer in India ; (8) vitamin A content of ghee ; and (9) types of pneumococci prevalent in the Punjab.

From the King George's Medical College Lucknow, four papers were published by the department of anatomy, 21 by the physiology department, three by the pharmacology department, six by the pathology department, two by the department of state medicine and one each by the departments of medicine, surgery and ophthalmology. The more important included (1) investigations of calcium content of blood in traumatic fractures ; (2) investigations into the use of fluorescine in the treatment of psoriasis ; (3) aetiology of primary glaucoma and (4) deficiencies in the diets of Indians.

Research was carried on as usual in the various departments of the Prince of Wales' Medical College, Patna. In the pathology department investigations included (1) rapid method for microsection diagnosis ; (2) suitable preservative to augment the keeping properties of blood for sugar estimation ; (*iii*) changes in blood protein (albumen, globulin ratio) and the effect of vitamins in ascites ; (*iv*) experimental inoculation of suspected human blood in animals and demonstration of *Spirillum minus* (rat bite fever) ; (*v*) new media for cultivation of the diphtheria bacillus and (*vi*) successful cultivation of tubercle bacillus and Entamoeba histolytica. The physiology department sent three papers to the physiology section of the Indian Science Congress. Other work in hand included (1) action of histamine on the suprarenal glands and (2) metabolism of plain muscle.

In the Medical College, Calcutta, research work was carried on in the department of chemistry and one paper on human nutrition was published in the Indian Journal of Medical Research. Further research work on carotene and fat metabolism was in progress. In the department of physiology, a short paper was published on the "Development of the adult of *Taenia echinococci* in a hydatid cyst in the muscle of a sheep" and work was being carried out on glycolysis in the blood of diabetics. Papers published by the pathology department dealt with (1) facial cellulitis ; (2) epidemic dropsy,—a historical survey and (3) epidemic dropsy—an epidemiological survey. The department of medicine was engaged on the following subjects :—(1) epidemic dropsy ; (2) therapeutics of muscle extract in various diseases ; (3) role of detoxicated vaccines in the treatment of infectious diseases ; (4) arteriosclerosis and high blood pressure ; (5) typhoid serum prepared from Vi antigen in the treatment of enteric fevers ; (6) the role of vitamin C. in infectious diseases especially in pneumonia and (7) the role of cobra toxyl in cancer and Hodgkin's disease.

The different departments of the Seth Gordhandas Sunderdas Medical College, Bombay, and the Hospital had the following investigations in hands :— (1) balanced diets (under the auspices of the Indian Research Fund Association and the Sir Dorabji Tata Trust and in collaboration with the Baby and Health Week Association) ; (2) mycetoma of fungus foot disease ; (3) bacteriological investigations by blood culture in certain eye diseases (under the auspices of the Indian Research Fund Association) ; (4) development of body parts of children between 6 and 11 years of age ; (5) the incidence of pneumococcal type infection in Bombay ; (6) Bacillus tuberculosis ; (7) phytin-splitting enzyme ; (8) calcium metabolism ; (9) the effect of amidopyrine on the blood picture and blood formation in rats ; and (10) the chemistry of *Entada scandens* and *Nyctan arbortristis.*

In the ear, nose and throat department of the Grant Medical College, Bombay, the treatment of otosclerosis with thyroxin did not give very satisfactory results and a further effort was being made to test this drug in selected cases. In the department of ophthalmology, clinical research work started in 1929 was continued on the effect of ultra-violet light therapy on external diseases of the eye and a paper on this subject was published. A clinical investigation in respect of the ocular complications of diabetes, based on the records of the past five years, was also carried out. The department of pathology carried out investigations into (1) longevity of the enterobins ; (2) tumours in mice ; (3) haematology in animals ; (4) tuberculosis of the central nervous system ; (5) longevity and life of human parasites outside the body ; and (6) parasites of the Bombay rats. Research work on the estimation of basal metabolic rate and the histology of the retina was conducted in the physiology department as also investigations on the metabolism of fats and a study of the variations of cholesterol and lipoids under different pathological conditions.

As regards the Medical College, Madras, the trachoma research carried out during the last two years in collaboration with the Director of the King Institute of Preventive Medicine was continued ; the results of investigations on the possible effects of solar radiation in the production of cataract conducted during 1935 were analysed and a short note was published ; an investigation in connection with the effects of malaria on the eye was continued ; the bacteriological investigations (egg—culture, etc.) in connection with superficial punctate keratitis carried out during 1935-36 were continued ; investigations into the conjunctival flora were continued ; the results of an investigation on the embryonic lens and on ectopia lentis were analysed ; a combined experimental investigation into the treatment of keratomalacia by red palm oil was carried out in collaboration with Dr. W. R. Aykroyd, Director, Nutritional Research Laboratories, Coonoor ; and investigations in connection with the fatty degeneration of the cornea started some years ago were completed. A few experiments were performed on cats to study the influence of histamine and acetyl-choline on intestinal movements. A thorough chemical examination of *Hedyotis auricularia*, an indigenous plant reported to be an effective remedy for amoebic dysentery and for enlarged liver due to toxic absorption from the gut, was carried out, but the only substances of possible pharmacological interest found present were the alkaloidal constituents. Laboratory work on remedies for neuromuscular debility, piles and certain types of insomnia were in progress. Work on gonadotropic hormones was under way.

Medical Schools.

117. Medical schools numbered 28, of which nine were in Bengal ; three in Madras ; four in Bombay Presidency ; two in U. P.; two in Punjab and one each in Bihar, Orissa, Burma, C.P., Assam, Central India, Sind and Bangalore. The information given in the succeeding paragraph relates to all schools except the Dacca Medical School, National Medical College, Bombay, and Medical School, Bangalore.

In the Amritsar Medical School, Punjab, the precentage of passes in the final L.S.M.F. examination was 64 in April and 59 in September. Twenty-three passed the final L.S.M.F. from the Ludhiana Medical School for Women. Sixty-three students from the Agra Medical School passed the final examination part I and 43 part II ; from the Agra Women's Medical school 14 passed part I and 13 part II of the final examination. Forty-four students from the Medical School at Darbhanga in Bihar passed the licentiate examination ; 66 including five women passed from the School at Cuttack. In Bengal, 83 students passed the State Medical Faculty and 31 passed the compounders' examination from the Campbell School, Calcutta ; 19 and 10 from the Lytton School, Mymensingh ; 34 and 16 from the Ronaldshay School, Burdwan. A total of 14 passed the final examination from the Chittagong School ; 42 from the National Medical Institute, Calcutta ; and 73 from the Calcutta Medical School. In C. P. 34 students passed the final board examination from the Robertson Medical School, Nagpur. From the King Edward Medical School at Indore, five students passed the final L. C. P. & S. (Bombay), 68 the final L.M.P. (Nagpur), two the final L.M.F. (Calcutta), six the sub-assistant surgeons' grade examination and 102 compounders' examination. Forty-one passed the L.C.P.S. final examination from the B. J. Medical School, Poona ; 20 from the B.J. Medical School, Ahmedabad ; 17 from the Medical School, Hyderabad, and 14 from the Christian Medical School, Miraj. Forty-four students passed the final examination part I and 72 part II from the Stanley Medical School, Madras ; seven and 18 from the Lady Willingdon Medical School for Women, Madras ; and 40 part II from the Missionary Medical School for Women at Vellore. Thirty-one students from the Berry White Medical School in Dibrugarh passed the final examination ; 17 from the Rangoon Medical School passed part I of the final examination and 20 passed Part II.

118. *The Countess of Dufferin's Fund.*—A total of 331 women students were on the rolls in different medical colleges in India.

The extent of the work done by officers of the Women's Medical Service may be estimated from the following figures which relate to hospitals in British India under the officers of the Women's Medical Service.

New in-patients	50,750
Out-patients (old and new)	894,524
Gynaecological cases—	
Indoor	10,392
Outdoor	74,239
Midwifery cases—	
Abortion	2,061
Normal labour	10,249
Abnormal labour	3,405
Operations—	
Abdominal	1,542
General or spinal anaesthesia	12,253

SECTION X.

HEALTH OF JAILS IN INDIA.

Population.

119. During 1936 the average daily jail population of the district and central jails of India was 143,118 or 733 less than in 1935 and 1,907 less than the quinquennial mean. Decreases occurred in N.-W. F. P. (—202), Punjab (—673), U. P. (—610), Orissa (—13), and Sind (—377) whilst the provinces of Bihar (+429), Bengal (+188), C. P. (+111), Bombay (+257), Madras (+440), Assam (+4) and Burma (+151) recorded increases as compared with the previous year.

Table X (*i*) gives the authorised accommodation and the daily average population in jails and sub-jails during 1935 and 1936.

TABLE X (*i*).

	Authorised accommodation excluding hospitals and observation cells.		Daily average population.	
	1935.	1936.	1935.	1936.
N.-W. F. P.	5,367	5,263	6,668	6,524
Punjab	15,013	15,013	21,992	21,337
U. P.	32,112	32,162	31,659	31,049
Bihar	12,786	13,007	11,679	11,958
Orissa	*	1,948	*	1,438
Bengal	17,220	17,091	22,724	22,718
C. P.	6,518	6,542	5,162	5,296
Bombay	14,304	14,995	8,919	9,357
Sind	5,482	5,260	5,211	4,365
Madras	20,129	18,468	16,375	15,997
Assam	3,579	3,704	4,014	4,019
Burma	20,993	21,370	20,434	20,575

In the provinces of U. P., Bihar, Orissa, Central Provinces, Bombay, Sind, Madras and Burma, the daily average population was below the authorised accommodation, excluding hospitals and observation cells. This does not, of course, mean that on particular occasions, the jail population did not exceed the accommodation, but generally it might be taken that there was no overcrowding. On the other hand, in regard to the provinces of N.-W. F. P., Punjab, Bengal and Assam, it is reasonable to assume that overcrowding did exist.

Sickness and Mortality.

120. The figures in this section relate to all classes of prisoners in central and district jails. Most of the figures will be found in table A of Appendix IX of this report.

NOTE.—The figures relating to Andamans have been dealt with separately on pages 247-249. The statistics given in other sections are exclusive of Andamans.

*Not available.

Tne constantly sick rate is calculated by taking the daily average of the aggregate of the daily totals of the sick during the year and making this figure a ratio per 1,000 of the daily average strength of the jail population. This rate varies considerably from province to province. Bengal has the highest rate of 38, for a majority of the provinces the rate ranges between 21 and 24, but in Burma and C. P. the rates are as low as 11 and 9 respectively.

With regard to India as a whole, the rate remained stationary during 1935 and 1936 nor did it depart from the quinquennial mean of 1931—35. As compared with 1935, slight increases were recorded in Punjab, Bihar, Orissa, C. P. and Madras; Bengal, Sind, Assam and Burma had the same rates for both years; whilst N.-W. F. Province, U. P. and Bombay registered lower rates.

The hospital admission rate is a ratio per 1,000 of the total number of admissions to the daily average population of the jails. This figure showed a further drop to 483 p. m. during 1936, the figures for last year and for the quinquennial mean being 497 and 564 p. m. respectively. In Punjab, Bengal, Bombay, Sind, Assam and Burma the rate was below that for 1935 and the mean for the previous five years. During the year under review Bengal returned the highest rate, *viz.*, 937 p. m., followed by 663 p. m. in Sind and 574 p. m. in the Punjab, whilst at the lower end of the scale are Madras 252 p. m., C. P. 232 p. m. and Burma 142 p. m.

The principal recorded causes of sickness are given in Table X (*ii*). Malaria as usual was responsible for much the largest amount of sickness.

TABLE X (*ii*).

	1935.		1936.	
	Admissions.	Rate p. m.	Admissions.	Rate p. m.
Malaria	19,683	137	18,704	131
Influenza	3,937	27	5,645	39
Abscess, ulcer and boil	5,429	38	4,823	34
Dysentery	4,239	30	4,376	31
Respiratory diseases*	3,596	25	3,603	25
Diarrhœa	2,894	20	2,218	15
Pneumonia	1,431	10	1,460	10
Anæmia and debility	1,057	7	1,045	7
Tubercle of the lungs	789	5	898	6
Pyrexia of uncertain origin	1,000	7	853	6
Sandfly fever	289	2	424	3
Kala-Azar	285	2	311	2
Enteric fever	278	2	270	2
C. S. fever	96	1	114	1

The death rate is calculated as a rate per mille of the average daily jail population. The rate for India was the same as in 1935, *viz.* 11 p. m. but was one p. m. less than the quinquennial mean. Death rates for the different provinces for 1935, 1936 and for the quinquennial mean are set out in the table at the end of this note. During the year under review the lowest rate, 8 p. m., was recorded in the U. P. and the highest, 19 p. m., in the C. P.

The chief causes of mortality are shown in Table X (*iii*).

*Excluding tubercle of the lungs and pneumonia.

TABLE X (*iii*).

	1935.		1936.	
	Deaths.	Rate p. m.	Deaths.	Rate. p. m.
Pneumonia	292	2·0	301	2·1
Tubercle of the lungs	310	2·2	279	1·9
Dysentery	100	0·7	110	0·8
C. S. fever	60	0·4	63	0·4
Malaria	71	0·5	58	0·4
Respiratory diseases*	46	0·3	56	0·4
Anæmia and debility	43	0·3	43	0·3
Enteric fever	37	0·3	39	0·3

Cerebro-Spinal Fever.—There were 114 cases with 63 deaths as against 96 and 60 in 1935. Of these 29 cases and 16 deaths were recorded in the Punjab jails; 26 and 19 in C. P.; 21 and 9 in U. P.; 14 and 6 in Bihar; 12 and 4 in Bengal Presidency; 8 and 7 in Bombay; 1 fatal each in Delhi and Madras Presidency and one case each in N.-W. F. P. and Sind.

Influenza.—The number of cases and deaths from this disease increased from 3,942 and 15 respectively in 1935 to 5,645 and 31 during the year under review; these figures also showed an increase as compared with the quinquennial average. With the exception of Orissa, Bengal, C. P. and Sind every province showed increases; in the U. P. the number of cases increased from 582 in 1935 to 1,452; in Bihar from 213 to 702; in N.-W. F. P. from 35 to 136; in Punjab from 53 to 155; in Bombay from 39 to 110; and in Assam from 51 to 179. Bengal Presidency as usual recorded the highest admission rate of 102 p. m., and other rates were Bihar (70 p. m.), U. P. (47 p. m.) and Assam (45 p. m.); all these being above the figure for all-India (39 p. m.).

Cholera.—The number of cases and deaths from cholera decreased from 18 and 5 in 1935 to 13 and 4; seven cases with 1 death were recorded in U. P., 4 cases and 2 deaths in Burma, one fatal case in Bihar and one case in Bombay Presidency.

Smallpox.—72 admissions with 8 deaths were reported as against 59 and 3 in 1935, the increase being due to a larger number of cases in Hijli Additional Jail in Bengal. Of the total, 36 admissions and 3 deaths were recorded in Bengal Presidency, 13 and 1 in U. P., 8 and 2 in Burma, 6 and 1 in the Punjab, 4 admissions in Bihar, 2 cases in Assam, one fatal case in Sind and 1 case each in Madras Presidency and Secunderabad.

Plague.—Except for one admission in U. P., this disease was absent.

Enteric fever.—Of the 270 admissions with 39 deaths, 46 cases and 7 deaths occurred in the Punjab, 38 and 2 in N.-W. F. P., 30 admissions in U. P., 29 and 6 in Madras Presidency, 26 and 2 in Sind, 24 and 3 in Bengal, 22 and 6 in Bihar, 20 and 6 in Burma, 20 and 4 in Bombay Presidency, 8 and 1 in Assam, 5 and 1 in C. P., one fatal case in Delhi and one admission in Rajkot.

Kala-azar.—Admissions from this cause numbered 311 with 4 deaths, of which 217 and 2 respectively were recorded in Bengal, 73 and 2 in Bihar and 21 admissions in U. P.

Dysentery.—Admissions for dysentery numbered 4,376 with 110 deaths, the ratios per mille of average strength being 31 and 0·8 respectively. Of the provinces, Assam recorded the highest admission ratio of 90 p. m. although this figure was less than that of 1935. Other high rates were Sind (82 p. m.), Bengal (73 p. m.), Bihar (67 p. m.) and Orissa (44 p. m.). Low rates

* Excluding pneumonia and tubercle of the lungs.

were recorded in N.-W. F. P. (3 p. m.), Burma (6 p. m.), Punjab (7 p. m.), U. P. (13 p. m.) and Bombay (18 p. m.). Bengal Presidency as usual recorded the largest number of admissions (1,498) from this cause.

Diarrhœa.—Bengal Presidency again recorded the largest number of admissions from this disease, *viz.*, 1,056 or 48 per cent. of the total, the rate being 52 p. m.; other high rates were recorded in Orissa 48 p. m., Sind 30 p. m. and Bombay 21 p. m.

Combined figures for dysentery and diarrhœa are given in Table X (*iv*) below—

TABLE X (*iv*).

	Admission rate p. m.			Death rate p. m.		
	1936.	1935.	Mean 1931—35.	1936.	1935.	Mean 1931—35
India	46	50	58	1	1	1
N.-W. F. P.	7	11	20	1	..	..
Punjab	19	24	49	..	1	1
U. P.	22	24	32	1	..	1
Bihar	80	65	109	2	1	2
Orissa	92	64	62	..	2	2
Bengal	125	139	127	2	1	1
C. P.	49	62	56	3	1	2
Bombay	39	38	74	1	..	..
Sind	112	103	85	1	3	1
Madras	36	44	47	1	1	1
Assam	93	111	136	2	4	3
Burma	8	11	17	..	1	1

Malaria.—The incidence of malaria was lower than in 1935 and was 19 per cent. less than the quinquennial mean. Most of the provinces shared in this decrease except N.-W. F. P., U. P., Bihar, Orissa and Madras where the admission rates were 159, 188, 58, 94 and 24 p. m. respectively. The lowest rates were recorded in Burma, Madras and C. P.

The general malaria death rate was lower, 0·4 p. m. against 0·5 p. m. in 1935. High rates were recorded in Bengal (1·0 p. m.), N.-W. F. P., C. P. and Sind (0·6 p. m.).

Pneumonia.—320 admissions with 74 deaths were registered in the U. P., 253 and 51 in Bengal, 160 and 38 in the Punjab, 126 and 18 in Sind, 123 and 30 in Burma, 92 and 14 in N.-W. F. P., 85 and 20 in Bihar, 83 and 17 in Madras, 67 and 10 in Assam, 54 and 13 in C. P., 45 and 4 in Bombay and 10 and 1 in Orissa.

The highest admission ratio was recorded in Sind, 36 p. m., followed by 17 in Assam, 15 in N.-W. F. P. and 12 each in Bengal and C. P.

The highest mortality rate was also recorded in Sind, 5·1 p. m. Other provincial rates were C. P. 2·8 p. m., Bengal and Assam 2·5 p. m. each, U. P. 2·4 p. m., N.-W. F. P. 2·2 p. m., Bihar and Punjab 2·0 p. m. each, Burma 1·5 p. m., Madras 1·3 p. m. and Orissa 1·1 p. m.

Tubercle of the lungs.—The number of admissions (898) showed a slight increase as compared with the figures for the previous year (789) and the quinquennial average (851), whilst the number of deaths (279) decreased as compared with 1935 (310). Admission and death rates for individual provinces will be found in Table A.

Accommodation provided for the segregation and treatment of tubercular patients was as follows :—

N.-W. F. P.—Abbottabad jail has a ward containing 40 beds.

Punjab.—New Central Jail at Multan has accommodation for 138 tuberculosis patients.

U. P.—Sultanpur jail (158 beds).

Bihar.—Arrangements for housing tubercular cases exist at Bhagalpur (35 beds), Buxar (12 beds) and Gaya Central (6 beds) jails. The District Jail at Purulia also provides 4 beds.

Orissa.—No accommodation is available in any of the jails in Orissa for the treatment of tubercular patients, and cases from Orissa are at present dealt with in Madras and Bihar Jails.

Bengal.—Special wards exist in Suri (43 beds), Comilla (30 beds), Alipore Central Jail (8 beds), Dinajpore (8 beds) and Bogra (1 bed).

C. P.—Chhindwara Jail (22 beds).

Bombay Presidency.—Special provision exists in the Central jails at Nasik Road (34 beds), Yeravda (8 beds) and Ahmedabad (6 cells).

Sind.—Special provision exists in the Central jail at Hyderabad (6 beds and 3 cells) and Karachi District Prison (6 beds).

Madras Presidency.—The Wellesley Sanatorium Jail, Bellary, with 160 beds, is set apart for treatment of tuberculosis patients. Provision also exists at Central Jail, Rajahmundry (2 beds), Vellore Central Jail (4 beds), Coimbatore Central Jail (8 beds), Vizagapatam Central Jail (2 beds) and Presidency Jail for Women, Vellore (8 beds).

Assam.—All pulmonary tuberculosis cases are treated in Sylhet district jail where there is a special ward of 23 beds.

Burma.—The Myingyan Jail has a tuberculosis ward with 50 beds. Accommodation is also provided at Rangoon and Insein (20 beds each), Myaungmya (8 beds), Thayetmyo and Moulmein (5 beds each), Akyab, Tharrawaddy, Bassein and Toungoo (4 beds each), Henzada (3 beds) and Mandalay (2 beds).

Weight of Prisoners.

121. This section deals only with convicts but all classes of jails are included.

Table X (*v*) gives in percentages the average gain or loss in weight of prisoners on discharge in the different provinces. The table is arranged in the order of loss of weight.

TABLE X (*v*).

Provinces.	Gained weight.	Stationary.	Lost weight.
Madras	64	28	8
Orissa	60	31	9
Punjab	41	48	11
N.-W. F. P.	53	36	11
U. P.	57	32	11
C. P.	62	27	11
Bihar	57	31	12
Bengal	49	39	12
Assam	59	28	13
Burma	60	25	15
Bombay	54	28	18
Sind	47	23	30

Provincial details.

122. *N.-W. F. P.*—Eight jails and eight lock-ups provided accommodation for 5,156 males and 107 females. No appreciable overcrowding occurred and the year was a fairly healthy one.

Admissions to hospital during the year were 3,457 and showed an increase of 22 per cent. over the previous year. The daily average no. of sick, however, declined from 166 to 155. Total deaths numbered 54. A classification of the causes of death is available only for convicts, among whom there took place 48 deaths. Of them, malaria accounted for 4, diarrhœa 3, dysentery 1, pulmonary tuberculosis 16, other forms of tuberculosis 3, pneumonia 11 and other causes 10.

The adolescent training centre at Haripur housed 500 prisoners. Pending the provision of a mental hospital all criminal and non-criminal lunatics are concentrated in the Peshawar central jail.

Dietary charges totalled Rs. 32-4-7 per head; hospital charges Rs. 4-12-4; clothing and bedding charges Rs. 11-1-10; and sanitation charges Rs. 1-10-4.

Punjab.—Excluding hospitals and observation cells, accommodation was provided in four central jails, one borstal, 17 district, two camp, one special and 11 subsidiary jails for 14,367 male and 646 female prisoners.

The daily average strength was 21,337—males 21,034 and females 303. Admissions to hospital and deaths fell from 12,790 and 218 in 1935 to 12,062 and 209. With the exception of the continued incidence of cerebro-spinal fever at the Borstal Institution, no serious epidemic occurred in any of the jails. The death rate of 9·8 p. m. was the lowest on record.

Malaria continued to be one of the chief causes of sickness, whilst tuberculosis and pneumonia caused most deaths. Cerebro-spinal fever was responsible for 17 deaths; dysentery 2; diarrhœa 5; malaria 8; tuberculosis 65; pneumonia 34 and other respiratory diseases 3. Cholera was absent. Cerebro-spinal fever is reported to have risen "in an epidemic form at various intervals."

Leprous prisoners were as before segregated in the special ward in Mianwali district jail, the daily average being 8. Of a total of eleven insane convicts, only four were transferred to the Punjab Mental Hospital as accommodation was not available.

Dietary charges increased to Rs. 28-15-2 per head; hospital charges were Rs. 10-6-4 per head; clothing and bedding Rs. 6-11-1 per head; and sanitation Rs. 2-5-9 per head.

United Provinces.—Conditions of life in the jails were somewhat improved during the year especially in respect of food. The daily average jail population further dropped from 31,659 to 31,049, the highest figure being recorded in September and the lowest in April. The total available accommodation for all classes of prisoners was sufficient for 30,619 males and 1,435 females. Sixtyeight convicts were released on grounds of sickness; 13 were transferred to mental hospitals and 226 died.

Compared with 1935, both sickness and mortality figures were higher. Admissions to hospital rose to 15,967, a slight increase of 3 per cent. over the figure for 1935 but the daily average sick decreased to 651, a fall of about 5 per cent. Malaria accounted for the largest number of admissions.

Total deaths numbered 255. Sixtyfour prisoners died of pneumonia, 32 of tuberculosis, 13 of other respiratory diseases, 8 of dysentery, 7 of malaria and diarrhœa and 2 of cholera. Plague was absent.

Leprous prisoners totalling 167 were as before concentrated in the Rae Bareli district jail. Although on admission these prisoners were all in bad or indifferent health, their general health improved and there was no death. Twelve cases reacted well to treatment and three were discharged as cured.

Dietary charges amounted to Rs. 26-7-0 per head; hospital charges Rs. 2-2-3 per head; clothing and bedding Rs. 3-3-10 per head; sanitation Rs. 1-7-5 per head. The water supply in several jails was improved.

Bihar.—Four central, 9 district and 40 sub-jails provided accommodation for a total of 12,786 prisoners, males 12,283 and females 503. Overcrowding has persisted since 1930 especially in the central jails. To relieve congestion in the permanent jails, the 'reduced' jails at Arrah, Chaibassa and Daltonganj continued to be used as district jails.

Health conditions were fairly satisfactory, although the daily average population rose from 11,679 in 1935 to 11,958, and, due to the prevalence of malaria and influenza in certain jails, daily sick and admission rates rose from 21 p. m. and 370 p. m. to 22 p. m. and 402 p. m. The death rate fell from 17 to 15 p. m.

Except for one fatal case, cholera was absent. Cerebro-spinal meningitis was the cause of 14 sporadic cases with 4 deaths in Bhagalpur jail. The higher incidence of dysentery, 682 cases with 18 deaths as against 507 and 9 in 1935, was ascribed to overcrowding and importation of infection. The examination of all newly admitted prisoners for hookworm infection was continued. Of the 15,508 cases examined, 6,748 or 43 per cent. were positive. All leprous convicts were concentrated in Muzaffarpur district jail; the daily average was 49.

Owing to insufficiency of beds in the Indian Mental Hospital at Ranchi, as also for want of suitable accommodation, criminal lunatics were temporarily transferred to the Central Jail at Hazaribagh. However, towards the close of the year, the Provincial Government, with the concurrence of the Bengal Government, authorised admissions up to 94 instead of 50, which was the previously sanctioned accommodation.

Malaria accounted for 624 admissions, influenza 759, anæmia and debility 36, pulmonary tuberculosis 66, pneumonia 83 and diarrhœa 123.

The juvenile jail at Monghyr was reopened. Arrangements were made for imparting instruction in hygiene and first aid to prisoners in the Monghyr, Gaya and Bhagalpur jails.

Dietary charges amounted to Rs. 36-8-0 per head; hospital charges Rs. 5-1-0; clothing and bedding Rs. 6-9-0 and sanitation Rs. 2 per head. The local Government sanctioned during the year the issue of (*i*) a special diet which includes milk, fresh vegetables and fresh fruit to pregnant female prisoners; (*ii*) special diet and clothing, etc., for division III prisoners accustomed to the western style of living.

Orissa.—This new province comprises the Orissa division of the old province of Bihar and Orissa and portions of Madras Presidency and the Central Provinces.

The Cuttack jail, one of the four district jails in the province, is being used as a central jail; sub-jails number 27. In order to relieve congestion in the district jails, the jails at Balasore and Angul were treated as such. Youthful offenders and juveniles were sent to the reformatory school at Hazaribagh in Bihar pending decision as to the proposed conversion of the jail at Angul into a juvenile jail. Three non-criminal lunatics were confined in Berhampur district jail.

Available accommodation provided for 1,821 males and 127 females and the average daily population was 1,438. In spite of general overcrowding the health of the prisoners was satisfactory. Admissions to hospital numbered 1,189; the daily average number of sick was 29; and deaths totalled 28.

Dysentery was the cause of 29 admissions in Cuttack jail, 5 in Sambalpur and 6 in Puri. Diarrhœa and colitis were prevalent in Cuttack. Malaria was responsible for 14 admissions in Cuttack, 29 in Sambalpur, 44 in Puri, 23 in Balasore and 10 in Angul. There were 6 fatal cases of cerebro-spinal fever and 3 cases with 1 death from cholera; and 4 cases with 2 deaths from pulmonary tuberculosis.

Dietary charges amounted to Rs. 37-10-3 per head; hospital charges Rs. 4-6-6 per head; clothing and bedding Rs. 4-13-3 per head and sanitation Rs. 1-3-9 per head.

Bengal.—Excluding hospitals and observation cells, accommodation was available for 14,848. The total average population, excluding sick in hospital and those in observation cells, was 18,436, but a number of detenues were not included in the statistics. Although part of the surplus population was accommodated in temporary sheds, there was serious overcrowding in the convict and the undertrial wards in most jails and particularly in the central jails. A new central jail at Dum Dum was under construction to replace two temporary jails.

Compared with 1935, the year under review was less unhealthy. Admissions to hospital and the daily average sick fell to 21,244 and 794 respectively. The number of deaths increased from 240 to 276 and the death rate from 11 to 12 p. m. These increases were ascribed to the higher incidence of pulmonary tuberculosis and of "other general diseases". Only one non-fatal case of cholera was recorded but dysentery was the cause of 1,481 admissions and 35 deaths; malaria 4,174 and 16; pneumonia 230 and 44; diarrhœa 1,008 and 2. Outbreaks of smallpox in certain jails and sub-jails were said to be connected with the prevalence of the disease among the general population of the province.

The Presidency Jail, Calcutta, continued the distribution of quinine treatments and cinchona products to post offices and dispensaries. A total of 42,540 lbs., 64,242 boxes of quinine treatments and 63,450 other tablets was issued.

The present arrangement, under which juvenile and adolescent prisoners are kept in the juvenile wards of three jails, are regarded by the Inspector-General as unsatisfactory.

Dietary charges amounted to Rs. 41 per head; hospital charges Rs. 6-15-0 per head; clothing and bedding Rs. 4-9-0 per head; sanitation charges Rs. 3-13-0.

C. P. and Berar.—The number of jails remained unchanged. Excluding hospital and observation cells, accommodation was available for 6,110 male and 432 female prisoners. The maximum population on any one day was males 6,026 and females 329.

The daily average population (5,296), admissions to hospital (1,202), the daily average sick (46) and the deaths (92) all increased. The death rate rose from 11 p. m. to 17 p. m. " Other general diseases ", pneumonia and cerebro-spinal meningitis were mainly responsible for the increases in admissions and deaths but there was a decrease in admissions from malaria, dysentery and colitis. The general health of prisoners on admission was poor and 51 of the 92 deaths occurred among prisoners who had been under six months in jail.

The quinine factory at the Nagpur central jail supplied, in addition to 1,528 lbs. of quinine tablets for free distribution, 807 lbs. of quinine sulphate, 685 lbs. of cinchona febrifuge, 32 lbs. of quinine hydrochloride, 417 lbs. of quinine tablets, 220 lbs. of cinchona febrifuge and 4,606 quinine boxes.

The year under review was the seventh year in which the Borstal Act was in force. During this period, 541 boys have been admitted into the Narsinghpur Borstal institution. Of the 337 boys who have been released, only 3 were readmitted during the year. In this institution one hour's morning drill is compulsory for every boy and games are encouraged.

Dietary charges amounted to Rs. 26-6-6 per head; hospital charges Rs. 4-8-3; clothing and bedding of prisoners Rs. 7-10-11; and sanitation including conservancy Rs. 0-15-5.

Sind.—One central, 2 district, 2 special, 59 sub-jails and 74 lock-ups in this new province provided accommodation for 5,260 prisoners of all classes.

The daily average population exceeded the authorised accommodation in the Hyderabad central and Sukkur district prisons. In order to relieve overcrowding, a new central jail at Sukkur was under construction.

Admissions to hospitals and deaths totalled 2,850 and 53. The daily average number of sick prisoners was 84. Of the total, 24 deaths occurred in Hyderabad central prison and 20 in Sukkur district jail.

Cholera and plague were absent. Cerebro-spinal fever was responsible for only one non-fatal case in the Hyderabad central prison. Infectious or deficiency diseases were reported as follows:—mumps 14 non-fatal cases; chickenpox 2, scruvy 3, para-typhoid 2, jaundice 13, smallpox 1 fatal case, erysipelas 2 cases and one death and typhoid 24 cases and 1 death. Among convicts dysentery was the cause of 246 admissions and 3 deaths, pulmonary tuberculosis 13 and 5, other tubercular disease 2 and 1; malaria 761 and 2; pneumonia 118 and 16; anæmia and debility 7 and 1; and diarrhœa 99 and 1.

Bombay Presidency.—In order to cope with the increased prison population, Worli temporary prison was opened, providing accommodation for 960 persons. With this additional accommodation and extensions of certain jails, accommodation was available for 14,598, males 12,553 and females 2,045.

The scheme for housing all criminal lunatics and mental defectives in Bijapur district prison was dropped, as a separate institution was not considered necessary for the few mental defectives requiring treatment. During the year 20 insane prisoners were transferred to mental hospitals. It was proposed to convert the Ratnagiri district jail into an additional Borstal School. The daily average population rose from 8,528 in 1935 to 8,931,—males 8,708 and females 223, but admissions to hospital and daily average sick decreased from 5,106 and 170 in 1935 to 4,357 and 150. This improvement was no doubt largely due to the diminished prevalence of malaria. Deaths totalled 91.

One non-fatal case of cholera was recorded in the Yeravda central jail and another fatal case in a sub-jail. Dysentery accounted for 126 admissions with 2 deaths; malaria 794 and 2; pulmonary tuberculosis 31 and 16; other tubercular diseases 14 and 5; anæmia and debility 65 and 1; pneumonia 42 and 3; other respiratory diseases 145 and 3; and diarrhœa 153 and 1. Cerebro-spinal fever was the cause of 8 admissions and 7 deaths, of which 7 cases and 6 deaths were recorded in Ahmedabad Central Jail. All contacts and suspects were isolated until bacteriologically declared free from infection.

Infectious diseases were recorded as follows :—Mumps 13 cases, influenza 108 cases with one death, chickenpox 7 cases, typhoid fever 18 cases with 3 deaths and para-typhoid 1 non-fatal case.

The manufacture of quinine tablets was continued at the Yeravda central prison.

Dietary charges amounted to Rs. 38-10-8 per head; hospital charges Rs. 2-2-11; clothing and bedding Rs. 3-14-9; and sanitation and water supply Rs. 6-2-4 per head.

In the Borstal institution, excluding hospital and observation cells, accommodation was available for 397 prisoners, but the daily average strength was 426 and the maximum population confined on any one day 444. Admissions decreased from 148 in 1935 to 83; deaths numbered two. Of the total, 5 admissions were due to dysentery, 17 to malaria, 21 to "other infective diseases", one to pneumonia and one to diarrhœa.

The revised diet scale which was sanctioned from 1st March, 1935, was continued with beneficial results.

Dietary charges amounted to Rs. 34-5-4 per head, hospital charges to Rs. 1-15-8; and clothing and bedding to Rs. 3-7-0 per head.

Madras Presidency.—Nine central, three special, 2 borstal, 2 district and 286 sub-jails provided accommodation for 18,468 prisoners (males 16,877 and females 1,591). The daily average population was 15,967, of which 15,589 were males and 378 females.

The concentration of mental defectives and recovered criminal lunatics in the district jail at Cuddalore was continued, 89 such prisoners being confined during the year. 192 lepers were confined in the leper annexes at Salem and Trichinopoly.

The daily average sick numbered 250. Among the convict population there were 3,525 admissions and 120 deaths. Of these 406 admissions with 13 deaths were due to dysentery; malaria 286 and 2; pulmonary tuberculosis 111 and 8; other tuberculosis 14 and 3; anæmia and debility 102 and 8; other general diseases 642 and 9; pneumonia 73 and 16; other respiratory diseases 126 and 4; and diarrhœa 29 and 1. Cholera was again absent. Anti-malarial measures were carried out as a routine. The quinine section of the Madras Penitentiary jail continued to work at a profit.

A protected water supply was available in every jail. Conservancy and drainage arrangements were improved.

Dietary charges amounted to Rs. 39-6-5 per head; hospital charges Rs. 3-3-9 per head; clothing and bedding Rs. 4-15-3 per head; and sanitation charges Rs. 3-4-4 per head.

Assam.—Available accommodation provided for 4,096 prisoners. Overcrowding continued in the larger jails in the plains districts, especially in Assam valley and, as a relief measure, extra accommodation was provided in the Dibrugarh and Jorhat jails.

The vital statistics of the year compared favourably with those for previous years. The daily average population was 4,019. Admissions to hospital fell from 1,992 to 1,686 and the number of deaths from 87 to 57. Of the total prisoners, 54 per cent were admitted to jails in good, 39 per cent. in indifferent and 7 per cent. in bad health. In the Assam Valley jails, 40 per cent. of the convicts admitted were habitual drug takers and in the Surma Valley jails 4 per cent.

Of the 57 deaths recorded, 52 were among convicts, 4 among undertrials and one was a state prisoner.

Although dysentery (305) and malaria (253) were the principal causes of admissions to hospital, their incidence, compared with the previous three years, was less. Of 2,654 cases examined, 420 or 16 per cent. were found infected with hookworm.

Dietary charges amounted to Rs. 34-1-9 per head; hospital charges Rs. 4-4-3 per head; clothing and bedding Rs. 4-5-8 per head; and sanitation 12 annas per head.

Burma.—The numbers of central (9), district (17), camp (2) and subsidiary (5) jails remained unchanged; these provided accommodation for 22,839 prisoners. The combined Borstal and senior training school at Thayetmyo and the juvenile jail at Meiktila continued to function.

The jail population totalled 70,414 whilst the daily average population was 20,575. Admissions to hospital (2,905), daily average number sick (218) and deaths (194) all decreased as compared with the previous year. The admission and death rates, 141·2 p. m. and 9·4 p. m., were the lowest on record, whilst the daily average sick rate of 10·6 p. m. did not compare unfavourably with 10 p. m. for 1934 which was the lowest on record. Of the total 183 deaths occurred among convicts, 60 were admitted to jail in good health, 36 in bad health and 98 in indifferent health.

Three deaths were reported among prisoners who, on admission to jail, were in such a bad state of health that they had to be sent direct to hospital. 71 prisoners died within six months of admission to jail and 23 between 6-12 months after admission.

Malaria with 288 admissions, dysentery (117) and pneumonia (116) were the chief causes of sickness among convicts; tuberculosis caused 39 deaths and 13 deaths were due to anæmia and debility. The number of opium consumers admitted was 1,486.

The quinine manufacture section at the Rangoon Central jail sold quinine to the value of Rs. 32,833.

Water supply arrangements were satisfactory. As regards conservancy the dry earth system was in use. A total of 1,995 primary and 32,707 revaccinations were performed. As a routine all prisoners, both convicts and undertrials, are vaccinated shortly after admission.

Dietary charges amounted to Rs. 25-2-0 per head ; hospital charges to Rs. 1-9-0 per head ; clothing and bedding Rs. 3-10-0 ; and sanitation Rs. 1-6-0 per head.

Andamans.

123. The jail population of Andamans consists of the following three classes of prisoners :—

1. Convicts in cellular and associated jails ;
2. Talabdars living in barracks or married quarters ; and
3. Self-supporters.

Hitherto the practice has been to combine the figures for all these three classes, but this gave a somewhat incorrect picture of general health conditions in the Andamans. The figures have therefore been dealt with in two parts, (1) those relating to the cellular and associated barracks and (2) those relating to the settlement, including talabdars and self-supporting convicts outside cellular jails.

In the cellular jail and associated barracks, the total accommodation available during the year under review was for 1,062 persons, including provision for 682 in the cellular jail and 380 in associated barracks, whilst the daily average strength was 815. These figures indicate that there was no overcrowding. The population at the end of 1936 was 717 males ; there were no female convicts. The daily average sick amounted to 25 p. m. of the average strength. The total number of hospital admissions during the year was 710, giving an admission rate of 871 p. m. of average strength. 55 admissions were due to malaria, 52 to influenza, 30 to sandfly fever, 28 to respiratory diseases, 13 to diarrhœa, 4 to pyrexia of uncertain origin, 4 to dysentery and 4 to pneumonia and 1 each to tuberculosis of the lungs, anæmia and enteric fever. The general health of the inmates of the cellular jail was on the whole satisfactory, and there were no admissions due to cholera, smallpox or plague.

Settlement including talabdars and self-supporting convicts outside cellular jail.—In the settlement the barracks and cells allowed 50 superficial feet per prisoner and had accommodation for a total of 4,635. This represents accommodation available to talabdars living in barracks and in married quarters, but the number totalled only 2,427. This question may be considered from another standpoint. The maximum population on any one day was 5,972. This figure included self-supporters, who made their own arrangements for accommodation, and other talabdars, such as free-of-charge servants and other departmental men, who were accommodated in employers' quarters or in other Government or private buildings. As these two groups formed about 53 per cent. of the maximum population, the inference is that there was no overcrowding.

The total number of admissions to hospital was 2,909 or 504 p. m. against 2,950 during 1935 and 3,069, the average for the last four years. Of this total 668 admissions were for malaria, 162 for dysentery, 195 for respiratory diseases excluding tubercle of the lungs and pneumonia, 67 for Weil's disease, 59 for diarrhœa, 38 for anæmia and debility, 20 for pneumonia, 17 for tuberculosis of of the lungs, 7 for influenza and 5 for enteric fever. Cholera, smallpox and plague were absent.

The total number of deaths in and out of hospital was 67 or 12 p. m. of the average strength. The increase in the number of deaths during the year under review was partly due to the inclusion of deaths amongst prisoners repatriated on medical grounds to India, if these died within 3 months of repatriation. It was also partly due to a mild epidemic of Weil's disease, which was responsible for about 24 per cent. of the total mortality. Deaths from different causes included pneumonia 11, tuberculosis of the lungs 7, dysentery 5, malaria and anæmia 3 each, respiratory diseases 2 and enteric fever 1.

Total admissions and deaths from malaria for the past five years are given below :—

Year.	Total admissions for malaria.	Total deaths in hospital.
1932	1,803	38
1933	7,621	16
1934	1,497	9
1935	1,353	7
1936	723	3

Energetic measures against this disease, including prophylactic and post-hospital issue of quinine, appear to have been responsible for the decrease in the admission and mortality rates. Convicts, if released during May-October after a three-months' period of probation in the cellular jail, were as far as possible not sent to highly malarious stations before they were acclimatised and completely treated for old malarial infections acquired in India. All persons discovered to be suffering from anæmia or enlarged spleens were admitted to hospital and treated. The introduction of routine treatment of malaria cases from certain parts with atebrin and plasmochin assisted in reducing the number of relapse cases.

The incidence of dysentery decreased during the year, the number of admissions and deaths being 166 and 5 against 210 and 3 in 1935. The seasonal incidence of this disease corresponded with that of heavy rainfall. People in outstations were advised to drink only boiled water. Routine and repeated after-treatment and stool examinations were made in the case of labouring convicts.

Admissions and deaths from Weil's disease for the past five years are given below :—

Year.	Admissions.	Deaths.
1932	25	8
1933	36	8
1934	29	5
1935	13	3
1936	67	16

The first case occurred in July and the largest number of admissions occurred during early October. Specially prepared anti-leptospira (human

serum) of Andaman strain was obtained from London and was used with a fair degree of success. Difficulty was experienced in persuading the self-supporters to seek early admission to hospital and cases generally came after four to five days' illness. The disease prevailed from July to the end of October, but only sporadic cases occurred in November and December. One noteworthy feature was that over 50 per cent. of the cases occurred in the vicinity of Ograbaraij area, where the men were employed on earth work. The prophylactic measures adopted included provision of abundant warm water and soap for washing the hands and feet on return from road making and the application of tincture of iodine to abrasions. The Chowdari and Jamadar of Ograbaraij village were also instructed to see that convicts complaining of severe muscular pains or showing even the slightest degree of jaundice of the conjunctiva should forthwith be sent to Dundas Point Hospital for treatment. It is reported that where these instructions were followed, the disease quickly subsided. The Senior Medical Officer, considering that this might have been a coincidence, has continued the same measures in 1937 in order to note their effect.

563 major and minor operations were performed. The total number of skiagrams taken during the year was 306, including 191 for accidents and medico-legal cases. A total of 542 vaccination operations against smallpox were performed.

The opening of a pathological laboratory solved a long felt need and about the end of the year, in addition to routine examinations of sputum, urine, fæces and blood, Widal, Kahn and Wassermann tests were also carried out. The following examinations were also carried out in the laboratory during the year :—Blood slides (6,295), sputum slides (194), urine examination (1,382), Wassermann reaction (98), Kahn (199), Widal (17), Fontana stain (43), fæces (810) and blood grouping (23).

Conclusion.

124. The health of the general jail population in India can be described as satisfactory during the year. The admission rate for all diseases showed a fall compared with 1935 and also with the quinquennial average. The general mortality rate (11 p. m.) was the same as last year but is one p. m. below the rate for the previous quinquennium. During the past two years, the mortality rates in most provinces have been below the mean for the previous five years, although the two provinces of C. P. and Bombay have recorded an appreciable rise during the year under review over the 5-yearly average. The fall in the incidence of malaria, which was the subject of remark in last year's report, has been maintained and this decrease is particularly noticeable in the provinces of Bengal, Bombay, Sind and Assam. There has also been a fall in the admission rates for "dysentery and diarrhœa". These figures indicate that the medical and health administration of Indian jails has continued at a satisfactory level of efficiency.

As regards the Andamans the convict population has been divided into two groups :—(1) those confined in cellular jails and associated barracks and (2) talabdars and self-supporting convicts. The combined admission and mortality rates for the two groups were 549 p. m. and 10 p. m. as compared with 651 and 10 in 1935. When these rates are separately shown for the two

groups the admission and mortality rates become 871 p. m. and *nil* for the first group and 504 p. m. and 12 p. m. for the second group. As similar figures are not available for 1935, comparative rates for the two years cannot be given on this occasion. Taking the groups together, however, there is no indication of deterioration in the health of the Andamans jail population ; on the other hand, the statistics for the year show that the health of the population as a whole has improved.

SECTION XI.

VOLUNTARY ORGANISATIONS.

*Indian Red Cross Society.

125. A Bill was passed through the Indian Legislative Assembly in October, entitled "The Geneva Convention Implementing Act, 1936" which prohibits (*a*) the use of imitations of the Red Cross on a white ground for any purpose whatsoever, and (*b*) the use of a White Cross on a red ground (constituting the federal arms of Switzerland) and of imitations thereof for purposes of trade. This legislation implements the revised Geneva Convention of 1929.

Among the major events in the international world the Italo-Abyssinian War and the Civil War in Spain stand out, for both have called for a great International Red Cross effort to diminish suffering and in both cases the Society responded to the call and played a part in the international effort.

The Indian Red Cross Society donated Rs. 5,000 to the Ethiopian Red Cross Society during the Italo-Abyssinian War and made further gifts including a consignment of chlorogen, a parcel of surgical instruments and 30 pounds of quinine.

When the Civil War broke out in Spain in August 1936, a similar donation of Rs. 5,000 was made for the assistance of the Spanish Red Cross. An appeal to the provincial branches produced a generous response and by the end of 1936 the Indian Red Cross Society had contributed a total of Rs. 12,000 to the International relief fund.

Maternity and Child Welfare Bureau.—The Maternity and Child Welfare Bureau, under the direction of Dr. Jean M. Orkney, W. M. S., continued to follow established policies and concentrated its attention on training workers, producing propaganda material and maintaining a central bureau of information.

The staff employed by local committees included trained *dais*, nurse-dais, midwives, maternity supervisors, health visitors and sub-assistant surgeons. Some branches concentrated on the provision of a domiciliary midwifery service, some on the maintenance of small maternity homes, others on welfare centres, nursery schools and crêches. The Madras and Burma Provincial Branches maintained health schools, and Mysore State Branch aided financially the Vocational Institute Nursery School, where nursery school teachers receive training.

The reconstruction and extension of the Lady Reading Health School, Delhi, was carried out during the year; accommodation is now available for 24 students.

The outstanding features of the work of the Victoria Memorial Scholarships Fund were (1) increasing requests for financial aid for *dai* training schemes from the less advanced provinces, (2) a growing opinion that the scope of the V. M. S. Fund should be widened to permit the training of *dais* other than hereditary or indigenous *dais*, (3) the focussing of attention on the vital importance of limiting the number of *dais* under training in any one area, of registering them and of supervising their work, and (4) the increasing popularity of *Dais'* Training Schools.

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*Prepared from a note supplied by Miss Norah Hill, A. R. R. C., Organising Secretary, Indian Red Cross Society.

The grant for Army Child Welfare to the Bureau from the Commander-in-Chief's fund fell from Rs. 15,650 to Rs. 5,000. It is greatly to the credit of the officers and men, and to the voluntary committees, that this was not allowed seriously to curtail activities on behalf of the families of soldiers in India. The number of centres aided was 14 British and 43 Indian.

King George Thanksgiving (Anti-Tuberculosis) Fund.—The proposed revision of the constitution engaged the attention of the Fund Committee throughout the year. The Managing Body was approached with the request that the Committee be separated entirely from the Indian Red Cross Society and constituted as an independent body on a wider basis than at present. The Managing Body agreed to forward this request to His Excellency the Viceroy, the President, but at the end of the year His Excellency's decision had not been received.

During the year a great deal of propaganda material was distributed free and the quantity sold from the Depôt also increased, thus indicating its growing popularity. The picture posters especially were in great demand. A new set of six coloured posters on "Signs and Symptoms of Tuberculosis" was published and 5,000 copies printed.

The propaganda cinema lorry toured successfully in the Punjab, North-West Frontier, Delhi and United Provinces, and also attended the Sun Eclipse Fair at Thanesar and a Rural Fair at Rohtak.

A second course of post-graduate training in tuberculosis was organised at the All-India Institute of Hygiene and Public Health, Calcutta, in January 1936, and was attended by 25 medical men.

The Hassan Masud Suhrawardy Anti-Tuberculosis Challange Shield for the best anti-tuberculosis work during the year was awarded to Bombay Municipality, which runs two dispensaries, a sanatorium of 32 beds and a hospital of 80 beds for advanced cases.

There are 16 Provincial and State Anti-tuberculosis Committees and some of them have district branches. Grants-in-aid totalling Rs. 19,860 were made to them by the Fund Committee.

Junior Red Cross.—Useful teachers' conferences were held in Shillong and at Shikarpur and Mirpurkhas in Sind, the former being attended by the Organising Secretary. Such group meetings are very valuable and it is to be hoped that every Province will in time hold an annual conference of Junior Counsellors.

The campaign through the schools for increasing knowledge of methods of preventing the spread of eye diseases continued. The lectures were well attended and aroused great interest.

The Sind Provincial Branch did specially good Junior Red Cross work, and increased both its membership and its activities.

Efforts are being made to interest junior groups in the important subject of nutrition and a series of posters has been prepared.

Cinema Section—Film Production.—During 1936 a new film "Two ways of Living," which is a two-reel film dealing with housing, was released. Two other new films, one on rural welfare entitled "Self-help in the Village", and one on *dai* training, were in course of preparation at the end of the year.

Film Circulating Library.—A comparative study of the figures for 1934, 1935 and 1936 shows the increase in the demand for library films :

Year.	35 mm.	16 mm.	Total.
1934 . . .	105	55	160
1935 . . .	163	90	253
1936 . . .	202	106	308

Rural Welfare.—Many District Red Cross Branches are now actively engaged in rural welfare work, which generally takes the form of training of village *dais* and education of mothers in maternity and child welfare. The publication of the Society's new " Rural Programme for Red Cross Branches " and the distribution of the League's pamphlet on the same subject helped to stimulate interest. The film entitled " Self-help in the Village " was delayed owing to pressure of cinema work, but the Society hoped to release it early in 1937.

The King George V Travelling Rural Dispensary in Delhi Province, established by a grant from the Red Cross portion of the Silver Jubilee Fund, began work in September, and was exceedingly popular with the villagers. It is administered directly by the Assistant Director of Public Health, Delhi Province.

The Central Provinces and Berar Branch was making special efforts to extend infant welfare work to rural areas and some of its health visitiors attended special rural training courses during the year. Raipur District Branch earmarked Rs. 13,000 from the Silver Jubilee Fund to inaugurate a " Village Sisters " Scheme to bring simple medical aid to the villages. This experiment will be watched with great interest.

Miscellaneous.—A new experiment was undertaken by headquarters in holding a Summer School for Indian ladies, in order to give them an opportunity to study the organization of Red Cross and other social activities. The subject chosen was " Social work for Women and Children " and the School was held in Simla from September 14 to 19. A most enthusiastic group of 36, of whom 12 were sent by Red Cross Branches in different parts of India, attended. The Society sincerely hopes that this successful initiative will be followed by similar Provincial study groups for women, who are taking an increasingly important part in all social work.

The Society continued to co-operate with the Trained Nurses' Association of India in the work of the National Committee for India, Florence Nightingale International Foundation. An annual scholarship was secured by investing a lakh of rupees from the Red Cross headquarters' portion of the Silver Jubilee Fund, but no suitable candidate came forward for the 1936-37 international post-graduate course. It is satisfactory that the Foundation now has a secure future in India ; henceforth it is hoped to send an Indian candidate every year.

The St. John Ambulance Association (Indian Council) and the St. John Ambulance Brigade Overseas.*

126. During the year the Indian Council had the honour of a visit from Colonel J. L. Sleeman, C.B., C.M.G., C.B.E., M.V.O., Chief Commissioner of the St. John Ambulance Brigade Overseas, as the representative of the Grand Prior, His Royal Highness the Duke of Connaught, to inspect the establishment of the Order in India.

*Prepared from a note kindly supplied by Miss Norah Hill, Indian Red Cross Society.

The Indian Council also had the honour of an unofficial visit from Lieut.-General Sir Aylmer Hunter-Weston, K.C.B., Chancellor of the Order, who expressed great satisfaction with the work that was being done in India in the name of the Order.

The following summary of the activities of the Association shows that instructional work is advancing satisfactorily. The number of classes held and certificates issued this year constitutes a record in every subject in spite of increases reported during the previous two years. Not the least satisfactory feature is that persons of all classes, communities and sexes profited by the Association's lectures and teaching, thus placing at the disposal of an ever-widening circle of the population the special knowledge and assistance which it is the Association's constant aim to extend.

During the year 30,965 persons attended courses of instruction in First Aid, Home Nursing, Hygiene and Sanitation, Domestic Hygiene and Mothercraft. As many as 20,272 qualified for the Association's certificates, including 18,153 in First Aid, 1,208 in Home Nursing, 683 in Hygiene and Sanitation, and 228 in Domestic Hygiene and Mothercraft. In addition 486 persons obtained the Voucher certificate by passing a second higher test in First Aid, 102 obtained Medallions by passing the same examination for the third time and 25 labels and 2 pendants were earned by passing further re-examinations in First Aid and Home Nursing. The Mackenzie School Course continued to make satisfactory progress, and during the year under report 8,992 students took the course and 7,084 qualified for certificates.

Classes—(*a*) *Military Forces.*—Classes were organised at a larger number of stations than before for men of the British and Indian armies, Indian State Force troops, the Auxiliary Force and Assam Rifles. During the year 514 British ranks received training in First Aid and 187 in Home Nursing, of whom 340 qualified for certificates in the former and 139 in the latter. In the Indian Army 349 men received instruction in First Aid and 232 received certificates.

(*b*) *Railways.*—3,479 persons received instruction in First Aid, of whom 2,399 obtained certificates and other awards compared with 4,156 and 2,889 respectively in the previous year.

(*c*) *Police.*—Two hundred and ninety-six classes in First Aid were held for members of the Police force. The number of candidates who received training in all centres totalled 4,196, of whom 3,042 qualified for Certificates and 28 for Vouchers. Excellent work was again reported from the United Provinces, where a large number of members of the District Police Force earned certificates, this province alone contributing about 40% of the above figures.

(*d*) *Prisons, Reformatory Schools, Criminal Tribes, etc.*—First Aid classes were, as usual, held in the jails in Assam, Burma, Madras and the Punjab. 704 persons received instruction and 508 qualified for certificates. The Criminal Tribes Settlement in the Punjab continued to take a prominent part in this training.

(*e*) *Mines and Factories.*—Forty classes in first aid were held in the various mining areas, at which 640 persons received training and 510 passed the examination and received certificates. Classes of instruction were also held in the Gun and Shell Factory, Cossipore, Ammunition Factory, Kirkee, and Clothing Factory, Shahjahanpur.

First Aid Road Stations.—The two First Aid Road Stations in Calcutta continued to do useful work. The Gwalior State Centre established First Aid Road Stations at Lashkar and Ujjain and the Punjab Provincial Centre was contemplating the provision of First Aid posts along the Grand Trunk Road between Attock and Delhi as a part of the scheme for First Aid on Highways being worked out jointly with the Indian Red Cross Society. In the Central Provinces, fifty such First Aid Posts are already in existence in the Dispensaries along the main roads on which traffic is heavy. During the year 339 persons received treatment at these Posts.

Ambulance Competitions.—The All-India Ambulance Competitions, which now take place every alternate year at the headquarters of Provincial Centres, were for the first time held in Bombay from 20th to 22nd January 1936.

The number of trophies open for competition was recently added to by a handsome shield kindly presented by Field Marshal Sir Philip Chetwode for competition amongst teams from Cadet Divisions of the St. John Ambulance Brigade Overseas.

Twelve trophies were competed for by 66 teams (including 5 ladies teams) and 24 individual ladies. The standard of work demonstrated was high, most of the winning teams obtaining no less than 80% of marks, the highest marks secured being 957 out of 1,000 in the King Emperor's Auxiliary Force Ambulance Challange Shield.

St. John Ambulance Brigade Overseas—Strength.—During the year the Brigade maintained steady progress. A new District was formed in the United Provinces. There has been an increase in the number of Divisions in almost all the Districts. Nine new Ambulance, 3 Nursing and 4 Cadet Ambulance Divisions were registered, and the total membership went up from 2,772 to 3,425. One of the Nursing Divisions was formed by the wives and daughters of Army Officers at Kohat, and classes in First Aid and Home Nursing were in progress at the end of the year at several other military stations with a view to forming Nursing Divisions and Voluntary Aid Detachments.

Staff Officer for Training.—The grant received from the Silver Jubilee Fund enabled the Association to sanction the post of Staff Officer for Training at Headquarters. This officer's duties consist of training Brigade personnel all over India and generally assisting officers in charge of Districts in the organisation of camps of instruction and inspection of mofussil Divisions which they cannot conveniently inspect themselves. For financial reasons this post was combined with that of the Director, Junior Red Cross, and Dr. B. K. Sikand, M.B., D.P.H., was appointed with effect from October 20th.

The British Empire Leprosy Relief Association.*

127. The Indian Council of the British Empire Leprosy Relief Association was formed in 1925 and, during subsequent years, it has pursued an anti-leprosy campaign on the lines of scientific research into the diagnosis and treatment of the disease, educational propaganda, surveys of the incidence of leprosy, the training of medical practitioners in modern methods of diagnosis and treatment and the establishment of leprosy clinics. Before the Indian Council was formed few facilities existed for the treatment of the disease, there was no general recognition of the extent and nature of the leprosy problem and the feeling among the medical profession and the public was one

*Prepared from a note supplied by the Honorary Secretary, British Empire Leprosy Relief Association (Indian Council).

of apathy and something akin to despair, because it was generally believed that little or nothing could be done to combat the disease. Owing largely to the activities of the Association, within recent years, a gradual change has occurred in the outlook of the people. Interest has been aroused, a general response has been made, in some parts of the country, to appeals for monetary help in organising leprosy relief work, surveys conducted in different parts of the country have given us some idea of the nature and extent of the infection and steady progress has been made in extending our knowledge of the causes and treatment of the disease. Whilst it is true that greater public interest has been roused in some parts of India than in others, in the country as a whole there are manifest signs of increased interest in the leprosy problem not only among medical men, but also among social workers and the general public.

The teaching work continued as in the previous years. Courses of lectures on leprosy were given to the D. T. M., L. T. M. and D .P. H. classes at the Calcutta School of Tropical Medicine. In addition three special courses on leprosy of one week's duration were held during the year for 40 doctors employed in the jute mills under the Indian Jute Mills Association, which resulted in increased collaboration with the jute mills authorities in the detection, diagnosis and management of cases of leprosy amongst their employees.

Another special course of two weeks' duration was held for 29 doctors from all over India including one from West Africa. Two similar courses of two weeks' duration were also held, under the auspices of the Assoication at the Leper Hospital, Dichpali, at which 14 doctors from the Hyderabad Medical and Public Health Departments received training. It has been proposed to hold special courses at Calcutta for doctors who are already engaged in leprosy work or want to make a special study of it, and to hold shorter courses for the benefit of general practitioners at other centres where suitable clinical material may be available.

Leprosy research and the general campaign against the disease have been dealt with in detail in Section II of this report.

*Activities of the International Health Division of the Rockefeller Foundation in India during 1936.

128. During the year co-operative activities were continued in the Madras Presidency, Mysore and Travancore States and the United Provinces.

In Madras Presidency, a malaria research laboratory was set up in February in quarters lent by the King Institute of Preventive Medicine, Guindy, and in November a field station was opened at Pattakottai in the Tanjore district for the study of malaria caused by irrigation.

Continued assistance was given to the Poonamallee Health Unit which started in October 1935. During the year a complete staff of health visitors, midwives and sanitary inspectors was secured and a lady doctor was appointed to assist the medical officer of health. The work was standardized in accordance with health unit principles and in respect to population, staff and methods.

In Mysore State, malaria studies were continued at three field stations and the work of controlling mosquito breeding at Mandya by using Paris green was continued. Special studies were undertaken in respect to *A. stephensi* and *A. culicifacies*.

*Prepared from a note kindly supplied by Dr. W. P. Jacocks of the Rockefeller Foundation.

In January, Mysore State inaugurated its first health unit at Closepet 30 miles from Bangalore. Much of the time during the year was devoted to training workers and to making surveys of the area.

In Travancore State advisory assistance in general health matters was continued and financial assistance was rendered for the fifth year to the Neyyattinkara Health Unit.

In the United Provinces, the Partabgarh Health Unit was assisted in its fifth year of work. The most important development is the interest which has been aroused amongst the people in the formation of health leagues.

Fellowships were given to six candidates for advanced study in public health subjects in foreign countries and in India and one travel grant was awarded to a member of the senior health staff to visit health work in Europe. Seven candidates returned from studies during the year.

The Countess of Dufferin's Fund and Women's Medical Service.

129. During the year the contribution received from the Silver Jubilee Fund enabled the National Association for supplying Medical Aid by Women to the Women of India (Countess of Dufferin's Fund) to extend its activities in a number of useful directions. For example, various Dufferin hospitals in different parts of India received grants for building and equipment. Further, as it had been realised that raising of the status of the nursing profession and attracting to it a better class of girl was essential for the improvement of hospital work, the Central Committee of the Association had under consideration the allotment of grants to certain training schools for nurses, in order to enable them to make improvements in their training, and of grants to Dufferin hospitals for assisting in the building and furnishing of better nurses' quarters.

In addition to bearing the cost of the salary of the W.M.S. officer, whose services had been lent for the post of Professor of Maternity and Child Welfare at the All-India Institute of Hygiene and Public Health, Calcutta, the Association financed, during 1936-37, the whole section including a Model Welfare Centre, which was used for teaching purposes.

The main source of income of the Countess of Dufferin's Fund is interest on investments, which amounted in 1936 to Rs. 7·20 lakhs. As usual, this income was mainly distributed in the form of grants to provincial Dufferin branches and to various hospitals and other institutions. In addition, a sum of Rs. 9,543 was set aside for scholarships to students in Medical Colleges, including 18 at the Lady Hardinge Medical College, Delhi, 3 at Bombay, 3 at Madras and 3 at Calcutta. Of the total number of scholarships, 18 were awarded from the Association Fund and the remainder from trust funds administered by the Dufferin Council. The Gilchrist Education Trust again made its annual grant of £150 to meet the cost of six scholarships held by students at the Lady Hardinge Medical College, Delhi. A sum of Rs. 1,616 was also received from the Hon'ble Mary Pickford Memorial Fund for founding a prize for the best student in anatomy at the Lady Hardinge Medical College. The whole of the income from these Trust Funds, which generally amounts to Rs. 3,900, was spent on scholarships.

The chief sources of income of the Women's Medical Service Fund were the annual contribution from the Govt. of India of Rs. 3,70,000, grants amounting to Rs. 32,800 from the provincial governments of C. P., U. P. and Bihar and interest on investments amounting to Rs. 26,500. This Fund maintained a cadre of 42 Women's Medical Service Officers, 11 temporary members, a training reserve of 15 officers and 3 temporary medical officers.

Lady Minto's Indian Nursing Association.

130. The control of this Association is vested in a central committee in India, provincial committees being responsible for the work of the branches. The existing six provincial centres are situated in the Punjab, U. P., Bengal, Assam, Rajputana and Burma. In addition to these centres, the following nursing homes and hospitals are staffed by nursing sisters of this Association :—(*1*) Walker Hospital, Simla ; (*2*) Ripon Hospital, Simla ; (*3*) Hindu Rao Hospital, Delhi ; (*4*) Georgina McRobert Hospital, Cawnpore ; (*5*) Portmore Nursing Home, Simla ; (*6*) Kashmir Nursing Home, Srinagar ; (*7*) Railway Hospital, Ajmer ; (*8*) Lady Willingdon Nursing Home, New Delhi ; and (*9*) Murree Nursing Home, Murree.

The income of the Association is made up of an annual Government subsidy of Rs. 35,000 ; interest on invested funds amounting to Rs. 25,182 ; donations, fees, subscriptions totalling Rs. 163,859 ; and miscellaneous Rs. 4,243.

The Bombay Presidency Baby and Health Week Association.

131. This Association, assisted by a Government grant of Rs. 5,000, continued its health propaganda activities. The Association also received a grant-in-aid of Rs. 3,000 from the Government of Bombay for rural health work.

During the year the Association assisted 166 centres in Bombay Presidency in various ways, including the loan of exhibits and cinema shows and magic lantern lectures given by the Association's trained workers. A total of 10,500 health leaflets was distributed and 435 requests for the supply of health literature were met. As many as 1,041 film reels dealing with public health and child welfare topics were projected, whilst audiences attending different functions arranged by the Association numbered about 456,220. Four leaflets, five pamphlets and one poster were revised and reprinted. The Association also had ready for loan 36 models suitable for Health and Child Welfare Exhibitions in urban and rural areas, these illustrating sanitary and hygienic practices as opposed to insanitary and unhygienic habits. The Association's revised set of 42 slides on " Food and Health " and the illustrated key lecture were in constant demand. The Association produced a new film entitled " Fairies of Health and the Food we Eat ".

A programme of research was conducted by the Association with a view to the further investigation of cheap balanced diets. This investigation which was partly financed by the Indian Research Fund Association and partly by a grant from the Tata Trust, was pursued simultaneously along two lines (*1*) nutritional and (*2*) analytical and experimental.

Health Propaganda Board, Madras.

132. This Board was constituted in 1921 for the purpose of stimulating and promoting an interest in and a knowledge of all matters connected with the general and personal health of the population of Southern India ; for the encouragement of sanitary and hygienic habits among all classes of the people ; for the diffusion of information concerning epidemics and the means of combating them ; and for other objects cognate to the promotion of the public health. For the furtherance of these objects the Board has prepared a considerable amount of propaganda material, including magic lantern slides, specimen lectures on health topics, cinema films and bulletins on health subjects. It also maintains, at its headquarters in Madras, a reading room and library which are open to the public.

Under the auspices of the Board, a Conference was held at Madras on 12th December, 1936, on 'Maternity and Child Welfare', under the Chairmanship of the Surgeon-General with the Government of Madras. The Conference was attended by a large number of medical men and women, in addition to other visitors, and the discussions ranged over a wide field, covering such problems as the training of midwives and health visitors, nutritional disorders of the eye in children, diets of the infant and toddler, the child in the nursery school, mental aspects of child welfare, a national maternity service, dental health in pregnant women and infantile eczema.

SECTION XII.

MISCELLANEOUS.

Physical Education.

133. For the proper development of body and mind " play is a vital principle in the growth of children and ranks as a major necessity in the life of the adult". The religious dance, with its free and rhythmic movements of body and limbs made to the accompaniment of music, even to the present day constitutes for primitive races a natural channel for the expression of physical and emotional cravings. The City State of Athens at the hey-day of her glory developed a form of education in which " Music " and "Gymnastic" formed the basic elements of instruction and training for her youths. The former included grammar and literature in addition to music in our sense of the word ; the latter dealt with physical training. Gymnastic exercises formed an important part of the course, these being everywhere supplemented by dancing, wrestling, boxing, swimming and discuss and javelin throwing, in all of which sports the Grecian youth was encouraged to excel. The Athenian ideal was a harmonious development of bodily and mental powers for, as Plato held, " the mere athlete becomes too much of a savage and the mere musician is melted and softened beyond what is good for him..... The two should therefore be blended in right proportions." It is doubtful whether the succeeding centuries have been able to improve on this Greek system. Life in these modern times may have become more complex and the demands made on the human body and mind be correspondingly more intense and varied, but the Greek conception of education as a disciplined development of man's personality through the simultaneous cultivation of his physical, intellectual and emotional powers is as true and apt as it ever was.

Under modern conditions, physical exercise and recreation are much more important parts of the individual's life than they were in the past when men were forced by sheer necessity to undergo various forms of exertion. One need only cite the cheap and rapid transport facilities of modern days as an example of the change in conditions. Further, an appreciable section of every community is engaged in sedentary occupations, whilst modern machines have eliminated heavy manual labour to a considerable extent and at the same time have introduced into the average worker's life a wearisome monotony which affords him little opportunity for self-expression. " There is nothing in our inheritance which savours of factory, treadmill or office stool. We must acquire these priceless habits, and often at the loss of our entire original inheritance which included freedom to fight or run or everlastingly to fool around. Life hates monotony but loves rhythm in heart beat, in intestinal contraction, in poetry, music, play." The conditions of modern civilised life, therefore, demand greater attention to physical exercise and recreation, if the health of the community is to be maintained at a sufficiently high level.

Within recent years, in all progressive countries there has been a general realisation that the State has a definite responsibility in regard to the physical education of the people. " In all the countries of Europe, as well as in America and Japan, physical education constitutes an integral part of the education in the schools. On the continent, physical education is compulsory in the universities also, while in England the universities confine their attention

mainly to sports and athletics.*" In 1935, a Committee of the British Medical Association, which was appointed at the instance of the Minister of Health, advocated a programme of physical training for the whole nation. Under the British scheme voluntary organisations assist in providing opportunities for recreation and physical development both to young persons and to adults who have passed beyond the jurisdiction of educational institutions. Two recent handbooks† issued by the Board of Education in England bear witness to the thorough manner in which the physical efficiency campaign has been planned.

In this country it is probably true to say that physical education has not received the attention it deserves, although here and there individual enthusiasm has produced excellent results, whilst in most of the universities and colleges, for instance, the students have long been encouraged to take part in sports and games of different kinds. Fortunately, within more recent times, an increasing interest in the subject has developed. The Provincial Governments of Bombay and the Central Provinces have recently set up advisory committees to report on the general question of physical education and both these committees have made comprehensive proposals to which reference will be made later. In some other provinces, also, the physical education of the student population has been a matter of serious discussion, whilst all-India organisations such as the Boy Scout and Girl Guide movements and provincial bodies like the Bratachari organisation in Bengal bear witness to a more wide-spread public interest. In no province, nevertheless, has the progress made been commensurate with the requirements of the situation and in the following paragraphs an attempt has been made to summarise such information as is available in the hope that it will do something to promote discussion of a subject which is of supreme importance not only to the State but to every individual. In the words of Lord Horder, " Every man endowed with health, strength and endurance is not only a life enriched in capacity for efficiency and happiness, but, *ceteris paribus*, a citizen of greater value to the State. From the racial point of view the fact that civilisation tends to preserve the weaklings and does not conform to the laws of sound breeding makes it the more important to train and multiply the fit and push them to the forefront; in fact, " planning " to this end must be the policy of a modern State."

Bengal.

A quinquennial report on the progress of physical education in Bengal, for the period ending with 1936-37, shows that much constructive work has been accomplished. In this province Government has appointed a Physical Director who controls and directs the development of physical education in the schools.

Co-operation of parents and school authorities.—Whilst during the previous quinquennium general opposition on the part of parents and school authorities was in evidence, under the belief that physical education was an unnecessary interruption of school studies, during the present period there has appeared increasing acceptance of its value. In this connection the Physical Director remarks that " the idea that games and exercises produced the hooligan mentality and strong muscles with un-informed minds had almost disappeared."

* Report of the Physical Uplift Committee appointed by the Government of the Central Provinces, India, 1938.

† 1. Recreation and Physical Fitness for Youths and Men, 1937.
2. Recreation and Physical Fitness for Girls and Women, 1937.

Syllabus for physical training.—Syllabuses of physical training were prepared for all types of schools and, whilst they discourage the former importance attached to ' drill ', they introduced many forms of ' indigenous exercises and games, swimming and other activities having a definite and immediate appeal to the interests of the students. In a sense, the approach to physical education was psychological rather than physiological..... The aim was to provide schemes suited to the particular needs of the young people of Bengal and to the limitations of the schools, so that what may be called a Bengal System of Physical Education might be gradually evolved."

Training of physical instructors.—In 1932, the Government established a temporary Physical Training Centre at which university graduates received a year's training in physical education. Up to 1937, 96 trained men were employed in different schools and colleges. With regard to middle schools, junior *madrasas* and primary schools, a short course of training was provided in exercises and games to as many school masters as possible. Eighteen courses were held. The All-Bengal Teachers' Association established in 1932 vacation courses in physical training and about 80 high school teachers undertook this training. For the physical training of women, a series of short courses was conducted by the Y. W. C. A. up to 1936 with the help of a subsidy from Government. Later a training centre for women students was established by the Physical Directress, with money obtained from Canada, at which an academic year's course would be given to candidates from all parts of India. The first course of the kind was completed in March, 1937.

Supervision of physical education.—Adequate supervision of the physical education programme of schools and the instructions of school teachers in up-to-date methods are essential for sound progress, specially when large numbers of schools are widely scattered over the country. For this purpose, at least one travelling inspector for each district is essential, but this complete scheme could not be introduced for lack of funds. Five suitable men were, however, appointed from February, 1937, as Sub-Inspectors of Physical Education, each being in charge of a division.

Contact between schools.—This purpose has been served by the Indian School Sports Association of Bengal which, with its 33 district and subdivisional sports associations, " has become the most influential and widespread of the many associations concerned with the promotion of physical activities in the province." The value of this Association is all the greater because of the fact that, although assisted by Government, the larger part of its funds is derived from subscriptions and its activities are carried on by voluntary workers.

Voluntary organisations.—The most prominent are the Scouts, Bratachari and the Junior Red Cross, but their activities have so far reached only 30,000 pupils, a comparatively small proportion of the total school population. These organisations, however, have their distinctive characteristics and make a wide appeal, so that their educative value is great.

One or two further points may be mentioned. A scheme for supplying tiffin to the school children in Government High Schools was started on 1st January, 1934, and has proved entirely satisfactory. A sum of four annas per month or three rupees per annum is collected from each pupil and for this sum it has been found possible to provide a simple and satisfactory meal every school day. Early objections raised by parents to this payment have

completely disappeared and it is now accepted as a normal part of the school demands, whilst the children are reported to have benefitted considerably.

The school medical officers who annually make a routine examination of several thousands of school children in Calcutta, were asked by the Director of Physical Education to prepare a record of all those who were in their opinion physically unfit for physical training. The following statement reveals the interesting fact that the number was very small :—

	Number of boys examined.	Number with at least one defect.	Number unfit for physical training.
1933-34	4,534	2,273 (about 50%)	2
1934-35	5,160	2,430 (about 47%)	5
1935-36	3,568	1,487 (about 40%)	2

The more prominent defects brought to notice included affections of the eye, tonsil, teeth and digestive system ; the proportion suffering from malnutrition was also high. The incidence of organic defects of a degree and nature likely to render physical training unsuitable was, however, surprisingly small.

Another important development was the encouragement, in the form of grants-in-aid, given to sports, gymnastic and similar clubs run on voluntary lines throughout the province. " These clubs form an essential part of the social life of young people, especially in the villages, where there is little to occupy the leisure time of youths and where healthy recreation can provide an antidote to the purely sedentary pursuits of the majority." The extension and popularisation of these voluntary associations and their assistance by means of expert advice and monetary help would appear to be a sound line of progress for the physical regeneration of the youth of the province.

Finally, towards the close of the quinquennium, a committee appointed by the Government commenced an investigation into the problems of physical education of the youth with a view to the setting up of machinery for the coordination of existing and for the promotion of additional clubs.

The activities of the Department of Physical Education relate only to the school-going population. As regards college students, the University of Calcutta appointed an Organiser of Physical Education, " but his sphere of work was limited and little was done to ensure either the appointment of trained instructors and game organisers in colleges, the levy of adequate sports fees, or the introduction of compulsory physical training for even first year students." An outstanding development was the institution of certificates of efficiency to be awarded to college students who passed a series of tests approved by the University. The Students' Welfare Committee of the University is also interested in physical education. The general awakening of interest and the good work already being done are of good augury for a wider development of the physical culture campaign in this province.

Punjab.

In this province, an Adviser on Physical Education has been appointed by Government and under his guidance considerable progress has been made. Each district has its own Assistant District Inspector for physical training.

The Adviser on Physical Education is also directing the provincial Scout movement and the linking of the two is of advantage in that the many-sided activities of the Scout's training helps to fulfil the purpose of physical education, which is that of increasing the boy's efficiency and his capacity for a fuller and richer life. In his annual report for 1932-33, the Director of Physical Training stated that " I believe that with the development of Cubbing, Scouting and Rovering, with that of physical education, the Punjab is giving a lead to India and in this respect I would like to mention that during the year we have had numerous deputations from different parts of India who have come to study our system of training and who have gone away impressed with what is being done."

The Government of the Punjab, in their review of the Report of the Director of Public Instruction for 1935-36, remarked that there was evidence of progress in many directions. " Physical culture and training, play-for-all and recreative indigenous games continue to show improvement. The organization of village health and games clubs and of district Olympic sports tournaments has made a rapid advance. The stress laid in schools on personal hygiene and the introduction of medical inspection by school doctors have brought about a noticeable change in the health and vitality of school students. The opening of first aid classes in rural schools will also prove helpful to the village population. Scouting continues to flourish. Great emphasis is now being laid on the social service aspect of the movement and Government wish to express their appreciation of the social service rendered by the Punjab Boy Scouts in the Quetta earthquake tragedy. Thrift societies are popular and Red Cross branches continue to do good work."

Madras Presidency.

Since 1920, this province has had the advantage of a College of Physical Education, which is run by the National Council of the Y. M. C. A. of India, Burma and Ceylon. The course offered covers one academic year, but the Principal has suggested that for a complete course two years would be required and has recommended a two-year course at the college in preference to sending men abroad. " It is our belief that remaining here for two years of special study and guided experience in the physical and health problems of their own country will give our Physical Directors a better background and fitness for successful work in India." The institution has an all-India character in that candidates from every province in the country are admitted to the college. Three types of course are offered ; for the Diploma Course a university degree is necessary and a teacher's certificate is considered as an additional qualification ; for the higher grade Government Certificate an intermediate examination certificate from a university is essential ; and for the lower grade Government Certificate a matriculation certificate or an equivalent qualification is compulsory.

The Director of Public Instruction reports that, "progress in the field of physical education was slow but improvement was noticeable in the gradually increasing tendency of schools to employ more higly qualified physical training instructors. The appointment and retention of unqualified physical training instructors is, however, still continuing in some cases."

The Senior Physical Director of the Provincial Government inspected and visited 49 and 15 schools respectively during 1935-36. He also organised four special courses and at different centres delivered lectures on the subject of physical education.

A temporary physical training class for women attached to the Lady Willingdon Training College was instituted and during 1935-36 twelve women were trained, of whom ten secured diplomas and obtained employment in recognised institutions.

The following table gives the number of institutions in Madras Presidency where gymnastics was taught :—

Public Institutions		Total number of institutions.	Number of institutions in which gymnastics is taught as per educational rules.	Number of institutions teaching native gymnastics.	Number of institutions in which gymnastics is not taught.
Arts Colleges		44	44	..	..
Oriental Colleges		23	..	..	23
Professional Colleges		12	10	..	2
Indian secondary schools for	Boys	540	533	7	..
	Girls	79	75	4	..
Indian Elementary schools for	Boys	43,665	35,538	6,887	1,240
	Girls	5,083	3,266	1,755	62
European secondary schools for	Boys	20	18	..	2
	Girls	36	36	..	..
European primary schools for	Boys	12	12	..	..
	Girls	7	6	..	1
Training schools for	Indians	143	143	..	..
	Europeans	2	2	..	..
Other special schools for	Indians	341	14	..	327
	Europeans	2	..	..	2
Total	1935-36	50,009	39,697	8,653	1,659
	1934-35	50,283	39,742	8,979	1,562

Central Provinces.

The following extracts from the annual report of the Director of Public Instruction for 1935-36 give an indication of the state of physical education in this province.

The University.—A whole-time director of physical education has been appointed by the University, Government contributing half the cost of his salary. Further details of the scheme of physical education were worked out during the year and embodied in an ordinance. In order to enable the colleges to take full advantage of this scheme, two physical instructors at Nagpur and one each at Jubbulpore and at Amraoti have been appointed as an experimental measure. This indicates a definite step of practical importance towards the promotion of the physical welfare of the students of Nagpur University.

Secondary Education for Boys.—All government high schools except three have now been provided with trained physical instructors. In aided and unaided schools, however, the need of more trained physical instructors is still keenly felt. Progress in the new syllabus of physical training has therefore been slow. A departmental committee is revising the syllabus in the light of experience gained with a view to making it more suitable to local conditions. Facilities for physical recreation and sports are provided, in many institutions, for girls reading in boys' schools. Organized games and sports both Indian and Western, formed a prominent feature of school-life.

Primary Education for boys.—The new syllabus has been introduced in most schools in the Jubbulpore circle. Two short training courses for the benefit of local primary teachers were successfully conducted by physical instructors attached to the Government high schools at Saugor and Damoh. A training class at Mahasamund was held during the year and fifty district council teachers were trained in the new syllabus which has been already enforced in all schools in the Chattisgarh circle. The Buldana district council held a special training class in physical instruction and the Senior Deputy Inspector reports that these trained teachers have been doing useful work.

Physical education of girls.—A very good attempt to carry out Danielson's course, reports the inspectress, is being made in anglo-vernacular and normal schools in the Jubbulpore circle. In schools of similar status in the Nagpur circle, games play an integral part in school life, though physical exercises have to be restricted in many schools for want of a play-ground. In most primary schools in the Jubbulpore circle, drill is carried out regularly though not as satisfactorily as could be wished. The need for a trained drill instructress is stressed in the Jubbulpore circle. For most of the primary schools in Nagpur circle, a strip of ground or a verandah constitutes the play-ground or rather an apology for it. Consequently, physical education is scarcely developed at all. Games and physical activities are glaringly conspicuous by their absence in Urdu girl's schools in the Nagpur circle and the inspectress thinks that this is inevitable as long as the schools are not staffed by women.

Training of men teachers.—The full course of physical education in accordance with the new syllabus was introduced in the first year Dip. T. Class. The Principal reports that a certain amount of difficulty was experienced in providing a sufficient amount of supervised practical teaching and fears that this difficulty will be even greater next year when both the classes will take the full course.

Reference has already been made to the recent report of a Committee appointed by the provincial government for the reorganisation of physical education. The Committee aims high, for it expresses the opinion that physical education should include within its scope not merely the student population but the community as a whole. Just as the rural child after leaving school quickly lapses into illiteracy, any scheme of physical education which stops with the school population results in physical education sharing the same fate. "Just as village libraries are provided for the villages, so will it be necessary to provide *akhadas* and gymnasium in rural areas. Unless the village population is interested in hygienic living and physical fitness, it will not be possible to expect any lasting effect from the training in physical well-being imparted in the schools."

The Committee rightly considered that the scheme of physical education should not restrict itself to matters dealing with recreation and physical fitness. Such activities, if they are to confer lasting benefit on the school population, should include health measures such as medical inspection and treatment of defects, appropriate diet and dress for variations in climate and, above all, education in hygienic modes of living. In regard to specific measures for physical fitness, indigenous forms of music and dancing and various types of physical exercise should be incorporated. It is also essential to give the whole training a social bent by the enlistment of every school boy in Students' Service Corps organised on a provincial basis.

The Committee's proposals for the administration of the suggested scheme are interesting.

"So far as this province is concerned we would suggest that direct action through a State department would be far more fruitful than indirectly acting through volunteer organizations and local authorities. Government may encourage and even assist local bodies and private agencies which work for improving the health of the students and people in general; yet the responsibility of improving the standard of physical efficiency of the people and taking the initiative for planned and thorough province-wide action in the matter should vest in some department of the State. The English model is hardly suited to the peculiar genius of this country and this fact has been abundantly established by the experience gained from entrusting to local agencies and private enterprise the provision

of elementary and secondary schools needed by the people. We are fully convinced that vital interests relating to the social life of the country should not be entrusted to the local or voluntary organizations which are impermanent and transitory, weak and poor, and as a rule rendered ineffective by internal squabbles and party strife. We are strongly of the view that the physical welfare activities suggested by us should be organized in schools and outside by a strong central State agency."

The suggestions made by the committee are that the Ministry of Education should be responsible for physical education and that the Minister should be assisted by a Central Board of Physical Welfare which would consist of a Chief Organiser for the province, who would also be the Secretary of the Board, the Director of Public Instruction, the Inspector General of Civil Hospitals, the Director of Public Health and three members nominated by the Minister, who would also nominate the Chairman of the Board. The life of the Board would be five years and its functions should include all suggestions contained in the report for improving the physical efficiency of the people. The Board should be empowered to compel, if necessary, local authorities and private managements of educational institutions to carry out the measures suggested for the health and well-being of the students, whilst it would have also power to collect funds and endowments from the public for these purposes and at the same time render assistance to private organisations engaged in physical uplift work, over which it would also exercise supervisory control. In regard to staff, it has been suggested that a beginning should be made with a Chief Organiser for the Province, an Organiser for each district and a physical Training Instructor for each *tahsil*. For medical inspection, the services of Government medical officers should be employed as far as possible and, when these are not available, private practitioners should be given honoraria for this work. The organisation of travelling dispensaries has also been advocated for the extension of medical relief. The formation of District Committees of the Board has been suggested for the control of district activities and a detailed estimate of the probable cost of the scheme to the Provincial Government was also drawn up.

Although this scheme has been presented in its barest outline, enough has been said to show that the proposals have been conceived on a broad basis and that the implications of a programme of physical culture for the whole province have been adequately realised. The Committee has suggested that the first stage of the scheme should be taken up on 1st April, 1938, and the results of this experiment will be awaited with interest all over India.

Bombay.

Early attempts at the physical education of school children appear to have been confined, as elsewhere, to the appointment of drill and gymnasium teachers in Government high schools and the sanction of grants-in-aid for such posts in aided institutions. In 1913, an officer trained in modern methods of physical culture, was placed on special duty for a period of two months in order to hold a class for teachers. Between 1917 and 1922 scouting and games increased in popularity and, in 1924, Government made their first grant to the Boy Scouts Association through the Department of Public Instruction. A grant was also made at a later stage to the Girl Guides Association. In 1925, a Director of Physical Education was appointed and that officer toured in different parts of the province and conducted courses of physical training and mass drill in some of the larger centres. Two years later, Government appointed a committee on physical education whose report was published in 1929, but the committee's recommendations were not carried out owing to ack of funds.

Mention has already been made of a recent committee set up by Government which reported in December, 1937. This report, like that of the Committee in the Central Provinces, has dealt with the subject in a comprehensive manner. The terms of reference were, however, limited to the physical education of primary and secondary school children and the wider aspect of general physical education was not considered.

The committee emphasised that physical education should be an integral part of general education, that the status of physical education should be raised to that of a major subject and that the Government should pay the full share of grant-in-aid on all expenditure incurred on this account by a school or a local authority, expensive games like tennis and cricket being left out of account. It was recommended that a Training Institute for Physical Education should be started in June, 1938, and that accommodation should be provided for a hundred students, half of the seats being if possible allotted to women applicants. In order to popularise the training, no tuition fees should be charged and about 10 per cent. of the students should receive stipends. The Committee were of the opinion that the Government should explore the possibilities of establishing at an early date a College of Physical Education on a par with the College of Engineering, providing a three-year course after the Intermediate Examination in Science. The necessity for short term courses for teachers in primary and secondary schools was also emphasised. An inspectorate consisting of a Chief Inspector with four Divisional Inspectors and the requisite number of District Inspectors was considered essential for supervision of physical education in the schools.

The creation of a Statutory Standing Committee to advise the Education Minister on all matters of physical education was another recommendation, this committee to comprise three *ex-officio* members and six non-officials and the chairman to be nominated by Government from among the non-officials. Some of the main tasks of the standing committee would be propaganda on physical education, the holding in schools of physical education days, weeks and months, the preparation of text books on dietetics for school children and education of the general population in the subject.

In regard to the provinces of N. W. F. Province, the United Provinces, Assam and Burma, the following extracts from the reports of the Directors of Public Instruction for 1935-36 give some account of recent progress in physical education :—

North-West Frontier Province.

School games and physical training.—The level of efficiency in drill has been fairly well maintained. In high and anglo-vernacular middle schools generally wholetime drill instructors are employed. But in the vernacular secondary schools this duty is performed by masters who have undergone a special course of physical training at the Government Normal School for Men, Peshawar. The need of a physical supervisor for the whole province which had been felt for some time past has now been met and it is hoped that the standard of physical education in primary as well as secondary schools will now improve. Hockey, football, volley-ball and basket-ball have been played in almost all anglo-vernacular secondary schools. A few schools which have no suitable play grounds are badly hampered in the matter of organising games. In rural schools, mass-drill and games together with physical exercises have been regularly done ; but in many cases the absence of a good level piece of ground has been a serious handicap. Besides ordinary drill and

native games in school hours, football, hockey and tennis were played after school hours under the supervision of the staff. Twice a week there was mass-drill and general parades. A special class for physical instruction is shortly to be started among the senior and junior vernacular class students.

United Provinces.

Physical training and games.—The organisation of games for all fit pupils still presents difficulties in respect of inadequate play grounds, material and supervision. These have been successfully overcome wherever the head of the institution has shown keenness and evoked the co-operation of his staff. On the whole, progress in physical training and games has been maintained. Schools report improvement in the health of the scholars. The Inspector of Benares again reports a successful year in the efforts of the intermediate school and college Sports Association which is the central organization co-ordinating the scattered activities of different schools and colleges in the city and suburbs of Benares. Group physical exercises during school hours will meet the needs of all fit scholars who cannot, owing to distance of home and school participate adequately in afternoon games. It is encouraging to note that physical education is receiving a more appreciable measure of attention in educational institutions than it did in the past.

Scouting has continued to make satisfactory progress in schools as a result of the activities of the Boy Scouts and the Seva Samiti Associations. The vigorous activities of the two scout organizations have given a renewed impetus to scouting in anglo-vernacular schools and the Inspectors' reports reveal the rapid growth of the Scout Movement.

While the midday meal of " germinated gram " has been introduced with appreciable success in a great majority of schools and has proved generally popular, the need felt for variety of school refreshment which will be equally simple and nourishing has still to be met. Pasteurised milk, fruit and nuts might alternate with sprouted gram. Sprouting gram as a school meal has the advantages of simplicity of preparation, nourishment and low cost and it should continue to be given until the more widespread use of pasteurised milk becomes practicable.

Assam.

Discipline, Physical and Moral Training.—Physical education continued to be received with great enthusiasm both by the boys and their guardians. Training camps were organised in several places with great success and educational officers and even outsiders joined them with readiness. The demand for physical education has become so great that a reinforcement of the existing staff of physical instructors is a real necessity. The need for the physical training of girls is once more stressed.

The problem of providing a mid-day tiffin as a necessary adjunct to physical exercises in the afternoon almost everywhere presented difficulties. Amongst the least expensive and at the same time the most adequate arrangements a tiffin of ' germinated ' gram and *gur*, and banana or fried ground-nut, at a monthly cost of four annas per head was tried out in the Karimganj Government high school with considerable satisfaction. The same arrangement has been in existence in Jorhat Government High School for some years.

Burma.

Training Courses.—Two courses in physical training of two weeks and six weeks duration respectively for vernacular teachers and English and anglo-vernacular teachers were held at Cabin Island, Rangoon, during the October and mid-summer holidays. Fifty-seven vernacular and 20 anglo-vernacular teachers attended.

During the year, short courses of from 10 to 14 days duration for teachers and 'normal' and elementary training class students were held at Rangoon, Nyaungleebin, Toungoo, Yamethin, Mandalay, Katha, Akyab, Moulmein, Chaurgzon and Tavoy. Altogether 587 teachers received instruction. This is good work calculated in the most economical way to spread sound methods of physical education amongst large numbers of people. At the end of the courses physical training displays were held wherever possible and desirable. Such demonstrations are organised to attract public attention and spread the benefit of physical education to villages.

For the first time in Burma, an all-Burma Physical Education Conference was held at the Government High School, Rangoon, in January 1936. In the evenings, various phases of physical education activities and games were exhibited by vernacular, anglo-vernacular and english pupils from the Rangoon schools. A physical education play was staged on the third day of the Conference. A physical training competition in drill and games for boys and girls was conducted under the auspices of the Rangoon Schools Athletic Associations.

At the close of the year, two Deputy Inspectors of Schools for physical training (one man and one woman) were appointed to strengthen this branch of departmental activities.

One thousand nine hundred and ninty pupils received instruction in boxing during the year. A successful all-Burma Inter-Schools Boxing Tournament, in which pupils from anglo-vernacular and english schools from the four corners of the province competed, was held in Rangoon in December, 1935. The standard was much higher than in the previous year.

The Boy Scouts Association in India.

Character and health are the two objects of every physical education movement, as has been pointed out by Lord Baden-Powell, the Chief Scout. The Scout's Association aims at both and this movement presents a record of continuous progress during the 15 years of its existence in India. Everywhere the Scout movement stands for social service, and to quote the example of the Punjab, the Scouts have to their credit such admirable services as they have rendered at the Kurukshetra Hindu festival and after the Quetta earthquake disaster, in addition to assisting in the fight against epidemics like smallpox and in the destruction of locusts, in rendering first-aid in street accidents and in promoting village welfare work.

The spirit of service, the inculcation of clean habits of life and the cultivation of body, mind and character to the highest level of efficiency are ideals shared by men and women of every country and climate. It is no mere coincidence that there is much in common between the ideals underlying the Scout Movement and many of the recommendations contained in the reports of the Bombay and Central Provinces Committees on physical education. These ideals are bound to find increasing expression in the methods adopted for a nation-wide programme of physical culture in this country.

Public Health Aspects of Rural Reconstruction.

134. It is not surprising that the question of rural reconstruction has received considerable attention within recent years. The subject indeed merits serious thought, because the Indian Villager occupies a most important place in the economic life of the country and, if his general welfare is to be promoted, it is necessary to give him greater opportunities than he has had in the past to attain better health, greater wealth and increased happiness. This is, of course, the goal of all rural reconstruction work, but, in advancing to this goal, the public health worker comes up at once against the evils of ignorance, poverty, dirt and disease, all helping to form a vicious circle from which the villager's escape is difficult, unless those primarily concerned with his welfare take the initiative.

Although every rural hygiene campaign demands collaboration from representatives of government, agricultural associations, scientific agriculturists, architects, engineers, educationists and doctors, the largest part must be played by those who are engaged in preventive medicine, because they are concerned with the search for the primary causes of the evils mentioned above and with planning for their decrease and eventual abolition.

It may be taken as axiomatic that no progress will be obtained unless the agencies at work, whether governmental or non-official,—secure the villager's active co-operation. It is now generally recognised, indeed, that public health measures thrust on a community by compulsion can never produce permanent results. This co-operation can only be obtained through preliminary educational work directed towards developing the villager's interest in schemes for his betterment. Patient presentation of facts bearing on the advantages of personal and environmental hygiene,—by means of lectures, talks, personal conferences and house-to-house visits,—is the first step to be taken to arouse in the villager a sanitary conscience, although the great difficulty here is that we are dealing mainly with people who have never learned sanitary principles in childhood. Whilst the most fruitful results, therefore, will probably be attained by teaching the children, the adult must not be neglected, for although the Indian villager does not readily accept new ideas, community life is not unknown to him nor is the ideal of service alien to his outlook. Successful preliminary work of this kind will make further advance possible through the formation of village organisations, whose members devote both time and service to the common good. Members of co-operative societies and non-official agencies, etc., inspired with this purpose, may thus be induced to form Health Leagues, for each village or group of villages, whose objects are to develop the ideal of self-help in relation to the care and promotion of their own health. All classes of the community should be eligible for membership and every individual in the village should be encouraged to contribute to approved health programmes. Some will most conveniently make their contributions in the form of money, but the poorer members should be permitted to offer free labour, an age-long custom in many parts of India. Labour devoted, for example, to the cleansing of the village tank or the excavation of manure pits will be just as acceptable as subscriptions in money or in kind and, by such means, all sections of the community will have the satisfaction of taking an active part in the betterment of their own surroundings. The public health officer of the area and other officials should all assist to their utmost; the health officer, the health inspector or health visitor should, for instance, attend all meetings of the Health League when public health measures

are being discussed in order to guide and advise, so that waste of effort may be avoided. Once the foundations of confidence and interest are well and truly laid, the superstructure of health improvements should be easy to erect.

Experience has shown it to be unwise to spread initial effort over too large an area, and that the most suitable unit comprises a population of not more than 40,000 to 50,000. Such a restricted area permits of intensive work because what is required in the first place is quality rather than quantity. The area included in the "Health Unit", as it has been called, not only serves as a demonstration centre, but provides the opportunity for testing methods planned to meet rural needs. When once the experiment in the lesser area has proved successful, it will be time enough to extend the field of operations to other groups of villages.

As the Health Unit's activities should all be based on standard public health methods, a permanent staff of trained workers must be provided. The cost of this staff is the contribution which can be suitably made by the governmental and local authorities primarily responsible for the welfare of the population. In the first place, a trained and experienced health officer is essential, because the success or failure of the scheme depends largely on his capacity to develop the team spirit in his subordinates and in the villagers, through the Health Leagues. He it is who is mainly responsible for the education work to which reference has already been made, but the other members of his staff,—which should include four qualified sanitary inspectors, four trained health visitors, eight certified midwives and, if possible, a woman doctor,—must also take a continuously active part in the same task in their respective spheres of action.

Before any very active programme of work is initiated it is essential for the health staff to make themselves familiar with local conditions. 'Know your area, know your people' should be their slogan, because until the health staff and the villagers become well acquainted, the necessary co-operation from the latter will not be forthcoming. The best way of 'knowing the area' is to carry out a house-to-house survey, the data secured being recorded and properly tabulated. This survey will indicate existing defects and the best lines on which these can be remedied. For instance, one of the first activities that can be usefully undertaken is the prevention of smallpox, which is such a common disease. Once the entire population is properly vaccinated, the people can be assured that further outbreaks of smallpox will not occur for several years.

If the survey, on the other hand, reveals that malaria is a major problem, suitable methods of control, including mass quininisation, should be put into practice at once. In these and other ways, suited to the area, the villagers will obtain concrete demonstrations of the value of the Health Unit scheme and will be the more willing to take part in other activities recommended by the health staff. During the survey, and while the first part of the programme is being carried through, personal contacts with individuals and families should constantly be practised and the results of those can be widened by the distribution of pamphlets and posters, by lantern and cinema shows, by wireless talks and by health demonstrations illustrative of present and future activities.

The proper evaluation of all health work depends on the accuracy of vital and health statistics and the health staff must make early efforts to improve birth and death registration and the records of diseases such as smallpox, plague and cholera. The co-operation of village headmen, school teachers,

revenue officials, etc. should be enlisted for this purpose and, if the work is properly handled, the health officer should soon be in possession of accurate details, not only of prevailing birth and death rates, but of the incidence of every important disease in his area. Uninformed opinion is often inclined to consider the collection of these records to be a waste of time and money, but the fact remains that no real estimate of progress in public health can be made without them.

The health officer should now be in a position to prepare a definite programme of work for his staff and for the village Health Leagues. This programme should be planned to cover a considerable period ahead and should include such items as :—

(*a*) the improvement of wells, springs and streams from which water supplies are obtained,

(*b*) the improvement of methods for sewage disposal, including construction of suitable latrines, cesspools and drains and the prevention of nuisances, such as the breeding of flies, arising from insanitary practices,

(*c*) the planning of suitable methods for the disposal of house refuse and manure, away from the vicinity of dwelling houses, *e.g.* by the construction of manure pits,

(*d*) minor repairs to roads and drains and the filling up of all depressions and pits likely to act as breeding places for mosquitoes.

(*e*) improved lighting and ventilation of houses and the lighting of the village itself,

(*f*) the improvement of markets, cow houses, bakeries, etc. and the protection of food exposed for sale ;

(*g*) improvement of food supplies and nutrition, *e.g.* by encouraging the villagers to grow vegetables and fruit and to increase the production of milk.

It is perhaps unnecessary to discuss here each of these items in detail, but emphasis must be laid on the point that, in introducing health measures, every endeavour should be made to improve existing arrangements by the use of local materials and processes rather than by introducing new fangled ideas with which the villager is totally unacquainted. The village carpenter and mason can very frequently do all that is necessary if sufficient trouble is taken to show them what is required. This is where the Health League can be of such value, for once the members are convinced of the possibility of effecting improvements, local initiative and interest will ensure their adoption and completion. This is no mere figment of the imagination because the successful fruition of this plan has already been witnessed in some parts of the country.

Reference may now be made to another important part of a well planned Health Unit scheme, *viz.*, the care of the mothers and children. This is the main function of the health visitors and midwives, although the health officer himself is also intimately concerned. At convenient centres throughout the area, clinics should be provided at which the mothers can obtain skilled advice for themselves and their infants and young children. By talking to individual women and by demonstrations given during home visits, the health visitors will be able to gain the confidence of the mothers, to induce them to attend at the clinics and to put into practice the advice they are given.

The clinics should be made as attractive as possible, otherwise the attendance will decline. At quite an early stage, it should be possible to hold classes *e.g.* in sewing, knitting and in the feeding of well and sick infants, and on every possible occasion carefully prepared talks on different subjects should be a part of the day's programme. It is necessary to stress this part of the Health Unit's activities and its importance to the whole scheme because the most certain way of ensuring success for the general health programme is to convince the women of its practical value. It is a common experience to find the interiors of village houses spotlessly clean, with every indication of devoted care, whilst the wider environment, which lies outside the sphere of the housewives' control, shows evidence of grave neglect. When once the women are persuaded that polluted water, lack of sanitation and swarms of flies are grave dangers to their children the health campaign has been won. In India this work, however, can only be carried on by women, because the majority of homes are closed to men workers. Educated Indian women have so far failed to realise the vast opportunities awaiting them in this field and it is a matter for regret that it is at present impossible to obtain a sufficiency of trained workers. A moderate estimate indicates that every year about 200,000 women in this country die of child-birth and that no less than 1¼ million infants die before they reach the age of one year. These figures represent an incalculable amount of suffering, pain and loss which is largely preventable and which can only be prevented when women trained in preventive health work become available. Is it too much to hope that the opportunities for service in this field will be seized by those who have at heart the love of their country and the welfare of their own sex ?

The subjects mentioned do not, of course, exhaust the list of activities which can be taken up in a Health Unit area. There is, for instance, the vastly important subject of improved nutrition and the prevention of malnutritional disease. If only adequate levels of food consumption could be achieved, it is more than probable that rapid improvement in the quality of human life would follow. By means of demonstration farms and by bringing improved agricultural processes to the notice of the village cultivator, it might be possible to induce him so to revise his methods that more and better food would be available to him and his family.

By some such organisation, working in close co-operation with others of the same kind, satisfactory progress can be made in respect of the public health part of a rural reconstruction campaign. The experience gained in respect of methods, cost of programmes and so on, will, moreover, be of value when work of the same kind is being extended to new areas and will give an indication of the extent to which public funds may be earmarked for that purpose. It is not suggested that other schemes may not also command success for " there is as little probability of discovering one key to the problems of human society as there is of finding one remedy for the ills of the human body." Whatever be the scheme, however, imagination and an understanding of the mental outlook of the villager are essential qualifications for work in this field.

The Prevention of Blindness.

135. In the opinion of most people, blindness is perhaps the worst physical disability with which man can be afflicted. " Much of the joy of life is lost to the blind. The economic handicap that follows blindness is serious. Few blind persons can compete on equal terms with the sighted. The loss to the community, in which these blind persons live, by reason of this reduction of their earning power means that this loss has to be made up by the sighted workers."

At a recent International Ophthalmological Congress held in Cairo, with which was associated the International Association for the Prevention of Blindness, a number of important papers were followed by general discussion as to the best methods of developing a preventive campaign against blindness. "The greatest lesson that the investigation of the causes of blindness has taught us is that most blindness arises from defective social conditions." MacCallan indeed holds "that the prevention of blindness is mainly an economic issue; an improved diet, a higher standard of living, a lower birth rate, a greater expectation of life, these are the aims to be secured; the causes of blindness will then spontaneously disappear." The social aspects of the problem were again and again stressed by successive speakers at the recent Conference and, although ophthalmological investigators have not yet solved all the problems associated with eye diseases, it seems nevertheless possible to carry through a preventive campaign with considerable hope of success. This is in the long run "a matter of social economy and organisation and the last word rests with public opinion." If only the educated public would take a greater interest in the campaign against blindness, many hundreds of persons doomed to live in darkness would be saved from this terrible fate and would, in place of being a burden, play their part in the productive life of the community.

As regards India, the number of the blind according to the 1931 census was 601,370, but probably this figure is a gross underestimate of actual facts. Lt.-Col. Wright, Professor of Ophthalmology in Madras, in a paper presented at the Cairo Conference, states that the main causes of blindness in India are :—

(*a*) *in children*

keratomalacia or xerophthalmia
ophthalmia neonatorum
congenital syphilis
hereditary blinding diseases.

(*b*) *in adults*

cataract
various optic nerve diseases (mainly syphilitic)
ulcers of the cornea
glaucoma
trachoma

(*c*) *in children and adults*

irritant remedies
smallpox.

He is, however, equally insistent that "the prevention of blindness in India and the East is not a medical problem but a social, economic and financial one." Keratomalacia is without doubt one of the chief causes of blindness in children and is essentially a diet problem, as Dr. Aykroyd has conclusively shown. The solution rests in the first place with the agricultural and animal husbandry departments and later with those responsible for the dissemination of information among the people. During recent years, a great deal of investigation has been done in respect of diet deficiencies and, if only these results could be applied in practice, much blindness could at once be prevented. As regards smallpox, the provincial Public Health Departments are responsible for vaccination, and particularly during more recent years, these Departments

have successfully reduced the incidence of this disease. But only too frequently does one still find smallpox ending in complete or partial blindness because of the ignorance of the parents in respect of the preventive value of vaccination. In this, as in other cases, the lack of any strong public opinion is a serious handicap to successful preventive work. "

According to Wright, India has in respect of blindness two classes of preventive measures, official and non-official. Of the former, the ophthalmic teaching centres in the medical colleges and schools are the most important, but the value of the expert instruction given to the students and post-graduates at these centres is to a certain extent lost because of the difficulty of inducing medical men to settle down in rural areas. At the same time, propaganda material in the vernaculars, prepared at headquarters, is distributed to every hospital and dispensary and this is bound eventually to have an effect.

The new maternity and child welfare branch of public health work, together with the maternity services, is now able to carry out preventive measures among infants, but here also the arrangements for the rural part of the population are still lamentably defective. Similarly with the anti-venereal campaign which, though efficiently organised in the cities, requires urgent extension to cover the rural population.

The most important of the non-official agencies include medical missions and the Indian Red Cross Society with the associated Junior Red Cross. The Red Cross Society has already issued very effective propaganda material and, being well qualified to help the International Association will almost certainly continue to play an important part in the general preventive campaign against blindness.

Nutrition.

136. In last year's report, brief reference was made to the international nutrition work of a Mixed Committee of the League of Nations and to the nutritional studies in India which had been carried out during the past two or three years. In this country investigations have been mainly concerned with (1) dietetic surveys in order to ascertain the actual state of nutrition of the people ; (2) analyses of common Indian foodstuffs for the purpose of determining their nutritive value ; (3) experimental work in controlled institutions intended for the discovery of suitable cheap methods of improving nutrition ; and (4) training of medical and public health personnel in general nutrition work and in the carrying out of propaganda on the same subject. An effort has also been made to link up agricultural research and practice with the requirements of human nutrition through the appointment of a Liaison Officer, who has his head-quarters at the Central Government's Agricultural Research Institute in Delhi.

In Section I of this report reference has been made to the investigations into the nutrition of the people of Madras Presidency carried out by the Nutritional Research Laboratories at Coonoor. The Director has expressed the opinion that the food available in that province is just sufficient to cover the energy needs of the people, provided it is evenly distributed, and that the average diet, which consists mostly of cereals, is lacking in animal protein, mineral salts and vitamins, which are essential for the proper physiological functioning of the body. Milk, eggs, fish and meat would supply the required animal protein, whilst green vegetables and fruits would provide essential vitamins and mineral salts. These articles, which have been termed ' protective ' foods

are, however, relatively more expensive than cereals and ordinarily they are eaten either in very small quantities or are entirely absent from the diet. These remarks apply equally to most parts of the country. The investigations have also demonstrated a widespread prevalence of conditions associated with a state of subnormal nutrition. Under the circumstances, the urgent need at present appears to be the formulation of methods by which the production of 'protective' foods can be greatly increased and their consumption encouraged.

In this connection milk occupies a position of great importance. In the first place, a large section of the population is wholly vegetarian and the only way of providing the valuable animal proteins is by means of milk and milk products. Secondly, as milk also contains most of the important mineral salts and vitamins, an increase in its consumption will help to correct existing deficiencies in these directions in the ordinary Indian diet. Dr. N. C. Wright, in his recent report on the development of cattle and dairy industries in India, states that all available evidence points to India's *per capita* consumption of milk averaging only about 7 to 8 ozs. per day, either in liquid form or as milk products. Wide variations exist between Southern and Northern India and also between urban and rural populations. For instance, in the Central Provinces the daily consumption figure is as low as 0·8 ozs., in Madras Presidency it is 1·6 ozs. and in the United Provinces 5·0 ozs., whilst in the Punjab it approximates to 10 ozs. In rural areas the consumption of milk is generally higher than in urban centres ; as regards the latter, an enquiry, covering nearly 2,500 working-class households in Bombay, showed that the average consumption of milk per head per day was less than half an ounce, supplemented by about 0·05 oz. of ghee. A similar investigation, covering the families of 97 jute mill workers in Bengal, gave a consumption rate of just under one ounce of milk and of 0·10 oz. of ghee. On the basis of the somewhat low standard of biological protein suggested by Dr. Aykroyd, Dr. Wright has calculated that the quantity of milk now available ; *viz.*, 7 to 8 oz. per head, should at least be doubled and that, if the standards of progressive European countries be adopted, the quantity should be increased three or four times.

Some interesting information is also available regarding the influence of income levels on milk consumption. An investigation carried out in 1930 into the milk supply of Lahore city by the Punjab Board of Economic Inquiry indicated that the daily average consumption was only 4 oz. per head. The variation in quantity at different economic levels is shown in the following table :—

Influence of income level on milk consumption (Lahore, 1930).

Income groups. (Rs. per mensem)	Daily Consumption per head. (oz.)
up to 25	2·8
26 to 50	9·2
51 to 100	12·0
101 to 200	13·6
201 to 500	16·0
501 to 1,000	20·0
1,001 to 1,500	31·2
1,501 to 2,000	31·2
2,001 and more	31·2
Average for Lahore	4·0

The average consumption of milk is higher in the Punjab than in any other part of India and yet, in Lahore, a rate comparable with the *per capita* consumption of the population of Western and Central Europe and of the United States of America is approached only at income levels of over Rs. 1,000 a month. It is also to be noted that, for levels above Rs. 1,000, additions of income do not appear to increase milk consumption.

The problem is twofold. Production of milk requires to be largely increased and its price must be reduced well below prevailing market rates if the smaller income families are to obtain adequate quantities. The " Report on the Physiological Bases of Nutrition " drawn up by the Technical Commission of the Health Committee of the League of Nations has suggested 1,000 grammes of milk for daily consumption or about 33·8 ounces which, as may be seen from the Lahore figures, is approached only by families with an income of over Rs. 1,000 a month. In his Health Bulletin on the nutritive value of Indian foods and the planning of satisfactory diets, Dr. Aykroyd has suggested 8 ozs. of milk for a balanced diet, whilst Sir John Megaw's provincial figures for *per capita* consumption quoted by Dr. Wright show that the Punjab is the only province which comes up to this standard. Even judged by the figure proposed by Dr. Aykroyd, it is obvious that the present position in respect of milk consumption is very unsatisfactory in most parts of India.

The problem of increasing milk production and of lowering its cost is a complicated question which involves co-ordinated effort between private producers and various departments of Government, such as the Agricultural, Veterinary, Forest, Public Health and Co-operative Departments, in respect of such questions as improvement of the breeds of cattle, extension of supplies of fodder, improvement of methods for production of clean milk and economic production on a co-operative basis. Further, regulation of private enterprise in the interests of the community would seem to be desirable, as also the provision of adequate marketing facilities to prevent unnecessary loss of what is a very perishable commodity.

The results of other investigations carried out by the Director of Nutritional Research have a direct bearing on this question and deserve mention. " Careful experiments have shown that the giving of 8 ozs. of skim milk daily to children on an average ' ill-balanced ' Indian diet result in an acceleration of growth and a great improvement in health and well-being." The average *per capita* cost of giving this amount of skimmed milk has been found to be about 12 annas a month, or less than half anna per day, a sum which should be within the means of many parents.

Whilst it is recognised that the encouragement of the production and consumption of whole milk is in every way desirable, the general poverty of the Indian masses makes it essential to explore every available method which would help to improve the present state of malnutrition. Further experiments have indicated that a large part of the benefit derived from skimmed milk is due to its calcium content. The daily administration to a group of children of half to one gramme of calcium lactate has been proved to produce a definite increase in their average weight, a slight increase in stature and an improvement in general condition, as compared with a control group not given additional calcium. Although calcium lactate is not quite as good as skimmed milk, it has the advantage of being much cheaper, the amount sufficient for a child costing only half an anna per mensem. The administration of calcium lactate for the correction of dietary deficiencies, in so far as it can do so, should therefore be well within the resources of a large proportion of the population.

Further experiments have thrown light on another aspect of the nutrition problem. In India, much ill health and malnutrition is due to a deficiency of Vitamin A in the diet. The richest source of this vitamin is cod-liver oil, which costs about 10 to 16 annas per pound. Various workers have shown that red-palm oil, which is derived from the fruit of the West African palm, *Eloeis guineensis*, possesses considerable vitamin A acitivity. Recently, experiments carried out at the Government Ophthalmic Hospital, Madras, have established that red-palm oil forms an effective substitute for cod-liver oil in the treatment of the average case of keratomalacia, a common and serious eye disease caused by deficiency of vitamin A in the diet. " The amount of vitamin A activity purchasable for a given sum in the form of red-palm oil is roughly three times greater than that purchasable in the form of cod-liver oil." Its more general use by the people should therefore be a valuable method of supplementing the deficiency of vitamin A in the ordinary Indian diet. The natural red palm oil possesses a taste and smell unfavourable to its use as cooking oil which is perhaps the easiest method of making its consumption universal. Experiments conducted at the Nutrition Research Laboratories in Coonoor have shown that mixtures of red-palm oil, in proportions of 6 to 12 per cent, with the common vegetable oils, such as cocoanut, gingelly, olive and mustard oils, were quite palatable and that, although cooking to some extent destroyed the vitamin A activity, enough remained " in the oil and the materials cooked in it to be of value in making good one of the most serious deficiencies in typical Indian diets."

The West African palm has been imported into Malaya and Burma and in the former country it has been grown extensively. A small but successful experiment in the cultivation of the red palm has also been carried out near Negapatam in South India. The climatic conditions of certain parts of South India approximate closely to those of Malaya and if the palm can be successfully cultivated in these areas, the supplies of cheaper Vitamin A so obtained would be of the greatest advantage to this country.

The Interim Report of the Mixed Committee on the Problem of Nutrition states that " the greatest single cause of defective nutrition in any community is poverty and the ignorance which is often associated with poverty." Whilst, therefore, education in regard to dietary practice occupies an important place in any programme for improvement of nutrition in order to ensure that available money is wisely spent, " it might well seem somewhat ironical if recognition were not first accorded to the fact that mal-nutrition is, in the great majority of cases, a consequence of inadequate family resources." The problem of nutrition cannot therefore be divorced from the general economic and other social policies of the State.

What is wanted is that even the poorer sections of the community should be able to obtain a sufficiency of all essential foodstuffs. Whilst it may not be practicable to fix the prices of these articles within certain limits, the desired object might be attained by measures directed towards increased production and towards reduction of the wide margin which so frequently obtains between the price the agriculturist gets for his produce and that which the consumer has to pay. A reduction of this difference would therefore seem to be an important step in the effort to improve the nutritional state of the people. Some years ago, the Minister of Agriculture and Fisheries in England set up a committee, under the chairmanship of Lord Linlithgow, to enquire into the distribution and prices of agricultural products and the committee came to the conclusion that, " taken as a whole, distributive costs are a far heavier burden

than society will permanently consent to bear." In the West various methods have been used to serve this purpose and State action and co-operative effort have both been employed. The following paragraphs give a short description of the methods in operation in France in this connection.

In France considerable progress appears to have been made in the supply of good quality articles of food to the public and in cheapening their cost by the development of producers' and consumers' co-operatives and by their mutual co-ordination of effort. The National Federation of producers of fruits and vegetables places at the disposal of its affiliated groups the latest information regarding improved agricultural practice, while, in conjunction with a similar national organisation for the campaign against garden and farm pests, it helps towards the institution of better methods of defence against these pests. " Central co-operative packing stations working for numerous producers in neighbouring communes or for syndicates " have been established and a national mark has been adopted which is affixed only to goods packed in these stations. The national mark is thus an index of quality and, while this system has not, for obvious reasons, been extended to small industries, arrangements reached between the National Federation of producers and consumers' co-operatives have ensured that " only those which accept the control of the National Federation are allowed to tender to the wholesale warehouse of the co-operatives of France."

" In the matter of milk products, the efforts of production associations have achieved incontestable results. The quality of the milk delivered for consumption and its purity have been very appreciably improved. The quantity of good milk produced has also increased. The filtering and pasteurisation of milk and cream, payment according to fat content, the establishment of markets and the development of supervisory syndicates for dairy products show what great progress has been made."

The consumers' co-operative societies have also done much to improve the quality and quantity of the food supplied to the people. By reducing overhead charges the purchasing power of their members has been increased and improved commercial methods and group purchases by the wholesale house of the co-operatives of France have raised the quality of the products supplied to the members, whilst the distribution of small branches even to the remotest country districts has made it possible to " bring to the rural population products formerly unknown or delivered under unsatisfactory conditions."

It is stated that " the policy of the trade associations and federations in the food branch, which is co-ordinated by the National Confederation of the Food Trade and Industry, is to reduce as far as possible the overhead charges and costs of foodstuffs before they reach the public and to see that the poorer classes obtain the benefit of abundant production." Further information on the whole question will be found in the third volume on " The Problem of Nutrition " published by the League of Nations, from which the above information has been culled.

In India, great need exists for an extension of the co-operative movement in agriculture. " As the example of Denmark shows, agriculture can thrive in a country of peasant proprietors only if its operations are organised on a co-operative basis and the middle man is dispensed with, so that all the profits may go to the cultivators." As the Indian Central Banking Inquiry Committee pointed out in 1931, the principle of co-operation is capable of wide application. Societies for the promotion of joint cultivation, for the provision

of seeds, manure and agricultural implements, for insurance, such as insurance of cattle, farm-buildings, crops and haystocks, offer various forms of co-operation for the furtherance of the welfare of the agricultural population. In India a beginning has been made in certain directions but the movement is as yet in its infancy. " The good work done by the cotton sale societies in Bombay, the irrigation and milk societies in Bengal, the co-operative seed societies and dairy societies in the Central Provinces, and the societies for the consolidation of holdings, clearance of silt in canals and sale of farm produce in the Punjab, encourages one to hope that given the necessary organising staff, co-operation will play in course of time as great a part in assuring the cultivator of the full return of his labour as it has in providing him with cheap capital." With betterment of the economic condition of the rural population it may confidently be expected that a corresponding rise in the standard of nutrition would result.

A. J. H. RUSSELL, COLONEL, I. M. S.,

Public Health Commissioner with the Government of India.

SIMLA ;
The 18th June, 1938.

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Appendix I

relating to

Section I.

Deaths in the rural areas of British India and the provinces are given in table G distributed according to months and in table K by age and sex. The total figure for British India does not, however, correspond in the two cases. This is because, for Madras Presidency, the figures shown in table G are for the area exclusive of municipalities alone, whilst those of table K relate to an area excluding municipalities and rural towns. Similarly, for Burma, while in table G the area is exclusive of 75 towns, in table K only 31 towns with populations of 10,000 and over have been excluded. For these reasons the total figure in table G is greater than that of table K by 51,215.

Deaths in urban areas are given in tables H and L. For the above reasons the total figure in table L is greater by 51,215 than that in table H.

The figures in tables G and H together equal those in K and L.

TABLE A.—ESTIMATED POPULATION ON 30TH JUNE, 1936 IN RURAL AND URBAN AREAS AND BY SEX.

	Rural.	Urban.	Total.	Male.	Female.	Area in square miles.	Density per square mile.
BRITISH INDIA . .	254,828,204	27,038,435	281,866,639	145,116,367	136,750,272	878,265	321
N.-W.F.P. . . .	2,158,509	334,333	2,492,842	1,348,013	1,144,829	13,308	177
Punjab	22,179,102	3,377,554	25,556,656	13,897,948	11,658,708	96,614	243
Delhi	209,983	475,809	685,792	395,566	290,226	578	1,100
U.P.	45,877,879	5,795,535	51,673,414	27,149,021	24,524,393	106,248	456
Bihar . . .	32,907,321	1,385,933	34,293,254	17,177,745	17,115,509	69,348	465
Orissa	6,936,372	223,224	7,159,596	3,404,205	3,755,391	19,347	359
Bengal	48,152,006	3,522,910	51,674,916	26,855,167	24,819,749	72,514	688
C.P. . . .	14,707,608	1,810,536	16,518,144	8,247,062	8,271,082	98,730	155
Bombay	15,475,082	3,674,042	19,149,124	9,918,809	9,230,315	76,389	234
Sind	3,471,732	732,981	4,204,713	2,360,415	1,844,298	46,668	83
Madras	42,669,470	3,874,250	46,543,720	23,033,956	23,509,764	125,438	352
Coorg . . .	155,226	9,474	164,700	91,207	73,493	1,593	103
Assam . .	8,149,000	207,513	8,356,513	4,401,116	3,955,397	31,382	253
Burma	11,376,153	1,431,877	12,808,030	6,526,022	6,282,008	117,402	103
Ajmer-Merwara . .	402,761	182,464	585,225	310,115	275,110	2,711	215

Table B.—Estimated Population by Sex and Age.

	N.-W. F. P.		Punjab.		Delhi.		U. P.		Bihar.		Orissa.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
Under 1 year	39,960	37,340	478,688	472,738	10,856	10,818	797,808	800,378	411,842	420,567	93,584	97,705
1—5 years	164,494	159,815	1,581,297	1,522,658	36,760	36,214	3,100,392	3,129,016	2,110,895	2,239,515	371,083	396,116
5—10 years	191,672	155,597	1,824,927	1,582,596	42,143	35,973	3,463,666	2,988,755	2,464,352	2,259,663	417,170	410,266
10—15 years	171,083	128,716	1,695,688	1,394,145	42,483	34,135	3,209,935	2,619,618	2,120,906	1,875,395	396,100	377,171
15—20 years	118,679	101,411	1,298,492	1,075,209	42,508	31,516	2,457,799	2,151,344	1,398,476	1,445,056	322,413	353,310
20—30 years	232,130	218,708	2,409,745	2,027,874	87,312	59,138	4,848,987	4,475,763	2,922,036	3,071,767	607,412	719,291
30—40 years	185,365	155,711	1,809,955	1,421,397	64,355	38,204	3,929,838	3,509,774	2,476,444	2,456,438	496,894	576,094
40—50 years	117,399	94,233	1,248,140	989,940	37,720	22,588	2,741,582	2,380,113	1,687,389	1,606,098	359,604	406,327
50—60 years	70,575	54,095	821,336	627,391	19,035	12,753	1,577,066	1,434,553	956,722	969,229	220,318	254,285
60 years and over	56,656	38,703	729,680	544,760	12,394	8,887	1,021,948	1,035,079	628,683	771,781	119,627	164,826

	Bengal.		C. P.		Bombay.		Sind		Madras.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
Under 1 year	856,218	859,382	285,458	292,503	287,755	292,424	58,337	55,166	639,178	661,232
1— 5 years	3,109,448	3,198,718	976,983	1,027,293	1,115,815	1,144,504	268,937	256,940	2,671,758	2,754,481
5—10 years	3,673,919	3,260,208	1,060,520	1,025,991	1,281,576	1,188,213	309,742	240,803	3,017,345	2,960,172
10—15 years	3,214,472	2,871,519	959,724	909,754	1,157,563	1,039,675	267,097	187,670	2,774,788	2,637,233
15—20 years	2,353,009	2,622,719	726,385	763,866	868,198	858,450	204,416	159,165	2,012,506	2,151,917
20—30 years	4,919,114	4,903,599	1,462,482	1,494,302	1,795,083	1,720,523	462,689	372,904	3,865,841	4,440,591
30—40 years	3,977,523	3,184,797	1,147,986	1,123,774	1,530,575	1,273,237	376,450	266,888	3,285,343	3,254,524
40—50 years	2,514,187	1,953,448	822,586	772,247	974,722	839,517	226,509	158,865	2,300,674	2,162,642
50—60 years	1,341,872	1,146,159	476,366	473,074	550,842	510,185	112,935	84,938	1,394,504	1,378,062
60 years and over	895,405	819,200	328,572	388,278	356,680	363,587	73,503	60,959	1,072,019	1,108,910

	Coorg.		Assam.		Burma.		Ajmer-Merwara.		Total	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
Under 1 year	2,142	2,208	145,355	111,397	164,801	175,248	9,714	9,771	4,281,696	4,299,377
1—5 years	7,594	7,746	227,066	166,738	691,647	721,901	34,566	34,773	16,468,735	16,796,428
5—10 years	9,593	9,182	416,947	294,320	796,405	787,946	38,134	33,491	19,008,111	17,233,176
10—15 years	10,063	9,052	657,718	498,911	744,207	721,098	36,035	30,357	17,457,862	15,334,449
15—20 years	9,193	7,586	781,667	761,327	606,300	629,728	30,966	27,217	13,231,007	13,139,821
20—30 years	19,756	15,395	363,094	402,827	1,201,735	1,156,025	57,886	49,951	25,255,302	25,128,658
30—40 years	16,453	10,417	506,023	451,845	954,463	807,200	41,806	36,352	20,799,473	18,566,652
40—50 years	9,443	5,984	595,175	539,690	626,841	561,149	33,076	27,103	14,295,047	12,519,944
50—60 years	4,449	3,481	569,273	588,141	408,638	394,941	18,514	15,602	8,542,445	7,946,889
60 years and over	2,521	2,442	138,798	140,201	330,985	326,772	9,418	10,493	5,776,689	5,784,878

M.—Males. F.—Females.

Table C.—Births in rural and urban areas.

	Rural.	Urban.	Total.	Rate p. m. Rural.	Urban.	Total.
British India	8,995,372	985,771	9,981,143	35·3	36·5	35·4
N.-W. F. P.	66,594	10,404	76,998	30·9	31·1	30·9
Punjab	973,703	125,443	1,099,146	43·9	37·1	43·0
Delhi	9,630	21,229	30,859	45·9	44·6	45·0
U. P.	1,626,159	261,439	1,887,598	35·4	45·1	36·5
Bihar	1,113,921	30,087	1,144,008	33·9	21·7	33·4
Orissa	249,066	5,631	254,697	35·9	25·2	35·6
Bengal	1,588,351	84,855	1,673,206	33·0	24·1	32·4
C. P.	574,306	76,962	651,268	39·0	42·5	39·4
Bombay	612,331	130,000	742,331	39·6	13·5	38·8
Sind	52,862	26,674	79,536	16·0	37·8	18·9
Madras	1,509,637	149,988	1,659,625	35·4	38·7	35·7
Coorg	3,480	430	3,910	22·4	45·4	23·7
Assam	233,355	6,349	239,704	28·6	30·6	28·7
Burma	366,687	48,077	414,764	32·2	33·6	32·4
Ajmer-Merwara	15,290	8,203	23,493	38·0	45·0	40·1

Table D.—Total Births by Months.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
British India	850,686	765,857	799,659	750,072	721,856	719,722	793,713	873,270	905,517	964,494	919,905	916,392
N.-W. F. P.	7,295	6,560	7,001	6,054	6,213	5,860	6,417	6,606	5,983	6,679	6,259	6,071
Punjab	99,373	90,391	90,166	74,937	71,750	70,484	87,919	97,502	99,581	108,247	104,555	104,241
Delhi	2,430	2,267	2,200	1,951	1,864	1,876	2,714	3,060	3,247	3,356	3,133	2,761
U. P.	162,725	144,158	143,902	142,387	125,252	124,294	143,464	180,479	193,091	194,507	167,076	166,263
Bihar	100,889	88,385	97,766	87,469	85,590	79,484	79,503	113,272	109,093	111,834	94,603	96,060
Orissa	17,906	16,242	18,311	19,778	23,468	26,745	25,791	21,696	20,528	19,593	21,956	22,683
Bengal	159,637	153,546	162,327	138,952	112,812	103,725	101,476	101,441	121,726	156,933	182,694	177,937
C. P.	52,201	46,879	51,496	48,671	48,415	46,723	54,743	61,507	62,616	62,423	58,957	56,637
Bombay	57,375	54,997	60,318	57,066	60,701	61,908	67,567	66,146	65,874	66,162	62,944	61,273
Sind	7,897	5,948	6,162	5,201	5,497	5,109	5,930	7,234	7,044	9,047	7,732	6,735
Madras	117,800	102,650	109,011	114,247	131,070	142,182	160,662	161,079	162,184	161,127	147,764	149,849
Coorg	316	337	339	322	328	360	336	411	340	289	275	257
Assam	27,502	21,507	18,863	17,244	15,266	14,001	14,335	16,246	19,236	22,358	25,502	27,644
Burma	35,339	30,252	30,111	34,101	31,926	35,041	40,648	34,459	32,860	39,594	34,453	35,920
Ajmer-Merwara	2,001	1,738	1,686	1,632	1,704	1,930	2,208	2,132	2,114	2,345	1,942	2,061

TABLE E.—TOTAL DEATHS BY MONTHS.

	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sep.	Oct.	Nov.	Dec.	Total.	Rate.
BRITISH INDIA .	522,132	464,099	491,714	511,941	534,785	492,200	499,812	553,981	542,655	556,135	566,305	639,972	6,375,731	22·6
N.-W. F. P. . .	4,528	3,808	3,744	3,044	3,488	3,704	3,093	2,900	2,651	3,321	3,618	4,358	42,257	17·0
Punjab . . .	49,080	46,843	45,552	41,393	53,572	49,744	42,337	47,546	43,428	45,075	47,875	49,847	562,292	22·0
Delhi . . .	1,372	1,194	1,203	1,270	1,713	1,454	1,284	1,589	1,312	1,341	1,326	1,263	16,321	28·8
U. P. . . .	83,203	75,231	75,444	86,940	102,142	95,973	82,790	94,723	103,049	107,492	94,207	93,433	1,094,677	21·2
Bihar . . .	51,019	46,388	52,424	53,278	63,935	53,606	52,725	66,612	60,971	59,869	57,831	68,156	701,814	20·5
Orissa . .	14,023	14,498	15,860	13,882	12,956	14,340	16,767	17,335	15,532	14,362	18,005	26,028	193,588	27·0
Bengal . . .	108,639	95,839	115,440	124,748	97,740	82,757	83,097	83,296	85,421	92,334	114,656	138,707	1,222,724	23·7
C. P. . . .	37,348	33,148	33,895	35,719	46,919	35,914	41,007	57,245	61,045	55,878	47,682	48,751	534,551	32·4
Bombay . . .	39,257	36,353	38,883	39,428	39,660	36,127	43,080	43,966	44,335	45,260	41,639	44,290	497,278	26·0
Sind . . .	5,818	5,632	5,465	4,266	3,823	2,981	2,867	3,130	2,989	3,417	3,992	4,045	48,425	11·5
Madras . .	89,373	75,177	74,461	70,224	71,698	75,765	90,444	92,230	85,145	83,835	96,771	115,716	1,023,839	22·0
Coorg . . .	273	230	343	310	387	493	383	368	308	286	247	277	3,905	23·7
Assam . . .	14,513	11,206	9,905	11,404	13,375	14,403	13,475	12,388	12,528	13,265	13,875	15,269	155,601	18·6
Burma . . .	22,460	17,321	17,847	19,861	16,794	19,057	25,423	24,265	22,873	26,225	23,615	28,632	264,373	20·6
Ajmer-Merwara	1,226	1,231	1,248	1,174	1,588	882	1,040	1,388	1,073	1,125	966	1,150	14,086	24·1

TABLE F.—DEATH RATES *PER MILLE* BY MONTHS.

	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sep't	Oct.	Nov.	Dec.
BRITISH INDIA	22·2	19·8	20·9	21·8	22·8	21·0	21·3	23·6	23·1	23·7	24·1	27·2
N. W. F. P.	21·8	18·3	18·0	14·7	16·8	17·8	14·9	14·0	12·8	16·0	17·4	21·0
Punjab	23·0	22.0	21·4	19·4	25·2	23·4	19·9	22·3	20·4	21·2	22·5	23·4
Delhi	24·0	20·9	21·1	22·2	30·0	25·4	22·5	27·8	23·0	23·5	23·2	22·1
U. P.	19·3	17·5	17·5	20·2	23·7	22·3	19·2	22·0	23·9	25·0	21·9	21·7
Bihar	17·9	16·2	18·3	20·4	24·1	20·5	18·4	23·3	21·3	20·9	20·2	23·8
Orissa	23·5	24·3	26·6	23·3	21·7	24·0	28·1	29·1	26 0	24·1	30·2	43·6
Bengal	25·2	22·3	26·8	29.0	22·7	19·2	19·3	19·3	19·8	21·5	26·6	32·2
C. P.	27·1	24·1	24·6	25·9	34·1	26·1	29·8	41·6	44·3	40·6	34·6	35·4
Bombay	24.6	22·8	24·4	24·7	24·9	22·6	27·0	30·7	27 ·8	28·4	26·1	27·8
Sind	16·6	16·1	15·6	12·2	10·9	8·5	8·2	8·9	8·5	9·8	11·4	11·5
Madras	23·0	19.4	19.2	18·1	18·5	19·5	23·3	23·8	22·0	22·4	24·9	29·8
Coorg	19·9	16·8	25·0	22·6	28·2	35·9	27·9	26·8	22·4	20 8	18·0	20·2
Assam	20·8	16·1	14·2	16·4	19·2	20·7	19·4	17·8	18·0	19·0	19·9	21·9
Burma	21·0	16·2	16·7	18·6	15·7	17·9	23·8	22·7	21·4	24·6	22·1	26·8
Ajmer-Merwara	25·1	25·2	25·6	24·1	32·5	18·1	21·3	28·5	22·0	23·1	19·8	23·6

TABLE G.—DEATHS BY MONTHS IN RURAL AREAS.

	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sep.	Oct.	Nov.	Dec.	Total.	Rate p. m.
BRITISH INDIA	465,971	412,332	437,672	455,724	472,659	438,178	442,423	439,634	484,778	499,352	511,073	580,863	5,690,659	22·3
N.-W. F. P.	3,949	3,283	3,278	2,604	2,978	3,205	2,591	2,465	2,297	2,898	3,176	3,873	36,597	17·0
Punjab	43,695	41,691	41,568	36,772	47,095	44,022	36,574	40,623	38,325	39,668	42,705	44,598	497,336	23·4
Delhi	535	491	450	504	640	497	391	456	429	480	504	462	5,839	27·8
U P.	71,474	65,206	64,426	73,215	84,960	82,051	69,701	78,367	87,199	92,915	81,418	81,710	932,642	20·3
Bihar	49,477	45,179	50,982	56,613	67,282	57,111	50,957	64,831	59,539	58,384	56,438	66,646	683,439	20·8
Orissa	13,668	14,192	15,523	13,599	12,646	13,956	16,286	16,884	15,132	13,959	17,572	25,561	188,978	27·2
Bengal	101,246	87,804	106,144	116,120	90,878	76,888	76,880	77,512	79,921	87,289	108,142	131,885	1,140,709	23·7
C. P.	33,168	29,224	29,776	31,212	40,681	31,487	35,738	49,968	54,600	49,900	42,757	43,548	472,059	32·1
Bombay	31,071	28,287	30,034	30,738	31,211	28,499	34,232	39,531	36,084	36,750	33,893	35,710	396,040	25·6
Sind	4,268	4,071	4,062	2,979	2,501	1,855	1,854	2,046	1,998	2,412	2,824	2,727	33,597	9·7
Madras	79,742	67,108	66,308	62,546	63,909	67,810	81,460	83,230	76,742	78,187	87,583	103,996	918,621	21·5
Coorg	230	201	310	274	342	433	330	317	269	246	215	241	3,408	20·7
Assam	14,183	10,935	9,667	11,152	13,068	14,037	13,177	12,093	12,199	13,028	13,464	14,975	151,978	18·6
Burma	18,483	13,842	14,298	16,707	13,584	15,805	21,635	20,439	19,363	22,627	19,850	24,213	220,846	19·4
Ajmer-Merwara	782	818	846	689	884	522	617	872	681	609	532	718	8,570	21·3

TABLE H.—DEATHS BY MONTHS IN URBAN AREAS.

	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sep.	Oct.	Nov.	Dec.	Total.	Rate p.m.
BRITISH INDIA	56,161	51,767	54,042	56,217	62,126	54,022	57,389	64,347	57,877	56,783	55,232	59,109	685,072	25·3
N.-W. F. P.	579	525	466	440	510	499	502	435	354	423	442	485	5,660	16·9
Punjab	5,385	5,152	3,984	4,621	6,477	5,722	5,763	6,923	5,103	5,407	5,170	5,249	64,956	19·2
Delhi	837	703	753	766	1,073	957	893	1,133	883	861	822	801	10,482	22·0
U. P.	11,729	10,025	11,018	13,725	17,182	13,922	13,089	16,356	15,850	14,577	12,789	11,773	162,035	28·0
Bihar	1,542	1,209	1,442	1,665	1,653	1,495	1,768	1,781	1,432	1,485	1,393	1,510	18,375	13·3
Orissa	355	306	337	283	310	384	481	451	400	403	433	467	4,610	20 7
Bengal	7,393	8,035	9,296	8,628	6,862	5,869	6,217	5,784	5,500	5,095	6,514	6,822	82,015	23·3
C. P.	4,180	3,924	4,119	4,507	6,238	4,427	5,269	7,277	6,445	5,978	4,925	5,203	62,492	34·5
Bombay	8,186	8,066	8,849	8,690	8,449	7,628	8,848	9,435	8,251	8,510	7,746	8,580	101,238	27·6
Sind	1,550	1,561	1,403	1,287	1,322	1,126	1,013	1,084	991	1,005	1,168	1,318	14,828	20·2
Madras	9,631	8,069	8,153	7,678	7,789	7,955	8,984	9,000	8,403	8,648	9,188	11,720	105,218	27·2
Coorg	43	29	33	36	45	60	53	51	39	40	32	36	497	52.5
Assam	330	271	238	252	307	366	298	295	324	237	411	294	3,623	17·4
Burma	3,977	3,479	3,549	3,154	3,210	3,252	3,788	3,826	3,510	3,598	3,765	4,419	43,527	30·4
Ajmer-Merwara	444	413	402	485	699	360	423	516	392	516	434	432	5,516	30·2

TABLE I.—DEATHS ACCORDING TO AGE.

	Under one year.		1—5 years.		5—10 years.		10—15 years.		15—20 years.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
BRITISH INDIA	886,367	734,449	589,872	554,500	180,562	163,590	102,671	89,662	106,438	128,339
N.-W. F. P.	5,479	3,893	3,804	3,223	1,317	1,062	903	806	943	867
Punjab	95,117	79,027	51,048	45,126	16,281	14,251	11,786	11,028	11,864	11,221
Delhi	2,659	2,365	1,351	1,349	329	292	252	291	285	447
U. P.	155,612	124,747	118,799	104,128	24,691	21,367	16,342	14,405	15,352	15,853
Bihar	74,475	60,495	75,239	69,634	23,870	19,684	13,762	10,401	12,817	11,575
Orissa	26,875	23,776	14,113	14,778	4,756	4,484	2,653	2,349	2,793	3,967
Bengal	155,484	130,472	94,761	94,977	46,730	42,371	24,381	19,755	23,842	34,891
C. P.	83,841	69,195	64,453	56,017	14,314	12,621	7,236	6,428	10,590	13,279
Bombay	67,226	56,063	52,818	53,115	10,823	11,215	5,116	5,424	4,827	6,809
Sind	5,227	4,422	3,651	3,036	1,237	1,093	918	746	939	882
Madras*	148,356	124,037	80,089	79,808	24,206	23,827	11,737	11,465	13,733	19,186
Coorg	362	347	217	204	111	94	73	86	96	109
Assam	19,630	16,522	12,796	12,317	5,760	5,063	3,202	2,460	3,006	4,255
Burma	43,860	37,162	15,200	15,356	5,911	5,955	4,133	3,860	5,165	4,731
Ajmer-Merwara	2,164	1,926	1,533	1,432	226	211	177	158	186	267

	20—30 years.		30—40 years.		40—50 years.		50—60 years.		60 years & over.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
BRITISH INDIA	236,845	295,992	248,552	233,376	255,550	189,660	255,507	204,144	474,983	445,285
N.-W. F. P.	1,967	2,033	2,003	1,949	1,932	1,512	1,926	1,243	3,152	2,143
Punjab	17,707	18,299	17,650	16,992	18,676	14,997	20,265	16,190	42,250	32,517
Delhi	607	920	547	581	624	427	520	402	1,134	939
U. P.	38,576	44,757	39,678	39,198	44,410	33,163	48,513	37,908	84,595	72,583
Bihar	31,777	32,008	32,376	27,771	30,136	23,269	30,179	28,118	45,343	48,885
Orissa	7,456	10,902	8,026	8,483	7,946	6,736	9,144	8,884	11,585	13,882
Bengal	57,095	77,807	57,494	50,283	55,086	38,396	47,957	35,692	72,800	62,450
C. P.	16,015	19,296	16,176	14,100	17,300	12,926	17,462	15,014	33,294	34,994
Bombay	14,603	20,661	16,482	16,129	18,771	13,035	19,859	14,083	45,422	44,797
Sind	2,449	2,700	3,012	2,491	2,951	1,749	2,564	1,266	4,311	2,781
Madras*	30,992	45,008	35,008	36,564	38,960	29,792	39,635	32,086	99,161	100,802
Coorg	251	284	289	231	256	156	210	127	200	202
Assam	6,358	9,613	7,202	7,011	7,052	4,863	6,798	4,710	9,694	7,289
Burma	10,561	11,057	12,193	11,185	10,879	8,270	9,793	7,964	20,996	20,142
Ajmer-Merwara	431	597	416	408	521	369	682	457	1,046	879

* Madras includes 613 deaths amongst Europeans and Anglo-Indians.
M.—Males. F.—Females.

TABLE J.—DEATH RATES ACCORDING TO AGE.

	Under 1 year.		1—5 years.		5—10 years.		10—15 years.		15—20 years.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
BRITISH INDIA	207·0	170·8	35·8	33·0	9·5	9·5	5·9	5·8	8·0	9·8
N.-W. F. P.	137·1	102·9	23·1	20·2	6·9	6·8	5·3	6·3	7·9	8·5
Punjab	198·7	167·2	32·3	29·6	8·9	9·0	7·0	7·9	9·1	10 4
Delhi	244·9	218·6	36·8	37·3	7·8	8·1	5·9	8·5	6·7	14·2
U. P.	195·0	155·9	38·3	33·3	7·1	7·1	5·1	5·5	6·2	7·4
Bihar	180·8	143·8	35·6	31·1	9·7	8·7	6·5	5·5	9·2	8·0
Orissa	287·2	243·3	38·0	37·3	11·4	10·9	6·7	6·2	8·7	11·2
Bengal	181·6	151.8	30·5	29·7	12·7	13·0	7·6	6·9	10·1	13·3
C. P.	293·7	236·6	66·0	54·5	13·5	12·3	7·5	7·1	14·6	17 4
Bombay	233·6	191·7	47·3	46·4	8·4	9·4	4·4	5·2	5.6	7·9
Sind	89·6	80·2	13·6	11·8	4·0	4·5	3·4	4.0	4·6	5·5
Madras	232·1	187·6	30·0	29·0	8·0	8·0	4·2	4·3	6·8	8·9
Coorg	169·0	157·2	28·6	26·3	11·6	10·2	7·3	9·5	10·4	14 4
Assam	135·0	148·3	56·4	73·9	13·8	17·2	4 9	4·9	3·8	5·6
Burma	266·1	212·1	22·0	21·3	7·4	7·6	5·6	5·4	8·5	7·5
Ajmer-Merwara	222·8	197·1	44·3	41·2	5·9	6·3	4·9	5·2	6.0	9·8

	20—30 years.		30—40 years.		40—50 years.		50—60 years.		60 years & over	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
BRITISH INDIA	9·4	11 8	11·9	12·6	17·9	15·1	29·9	25·7	82·2	77·0
N.-W. F. P.	8·5	9·5	10·8	12·5	16·9	16·0	27·3	23·0	55·6	55·4
Punjab	7·3	9·0	9·8	12·0	15·0	15·1	24·7	25·8	57·9	59·7
Delhi	7·0	15·6	8·5	15·2	16·5	18·9	27·3	31·5	91·5	105·7
U. P.	8·0	10·0	10·1	11·2	16·2	13·9	20·8	26·4	82·8	70·1
Bihar	10·9	10·4	13·1	11·3	17·9	14·5	31 5	29·0	72·1	63 3
Orissa	12·3	15·2	16·2	14·7	22·1	16·6	41·5	34·9	96·8	84·2
Bengal	11·6	15·9	14·5	15·8	21·9	19 7	35·7	31·1	81·3	76 2
C. P.	11·0	12·9	14·1	12·5	21·0	16·7	36·7	31·7	101·3	90·1
Bombay	8·1	12·0	10·8	12·7	19·3	15 5	36·1	27·6	127·3	123·2
Sind	5·3	7·2	8·0	9·3	13·0	11·0	22·7	14·9	58·8	45·6
Madras	8·0	10·1	10·7	11·2	16·9	13 8	28·4	23·3	92·5	90·9
Coorg	12·7	18·4	17·6	22·2	27·1	26·1	47·2	36 5	79·3	82·7
Assam	17·5	23·9	14·2	15·5	11·8	9·0	11·9	8·0	69·8	52·0
Burma	8·8	9·6	12·8	13·9	17·4	14·7	24·0	20·2	63·4	61·6
Ajmer-Merwara	7·4	12·0	10·0	11·2	15·8	13·6	39·8	29·3	111·1	83·8

M.—Males. F.—Females.

TABLE K.—DEATHS ACCORDING TO AGE IN RURAL AREAS.

	Under one year.		1—5 years.		5—10 years.		10—15 years.		15—20 years.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
BRITISH INDIA	772,960	639,259	527,940	494,788	166,156	149,521	93,675	79,233	94,835	111,596
N.-W. F. P.	4,708	3,320	3,334	2,776	1,191	929	803	690	824	730
Punjab	83,782	69,481	45,130	39,558	14,598	12,644	10,589	9,586	10,493	9,533
Delhi	892	789	516	510	122	93	93	79	105	127
U. P.	126,356	100,028	103,976	89,567	22,070	18,761	14,762	11,890	13,480	12,060
Bihar	72,141	58,676	73,728	68,315	23,392	19,221	13,393	10,043	12,398	11,071
Orissa	26,372	23,296	13,870	14,588	4,685	4,419	2,579	2,286	2,712	3,877
Bengal	146,569	122,807	89,953	90,452	44,549	40,373	22,864	18,482	21,951	33,030
C. P.	73,243	60,570	57,536	49,724	13,056	11,438	6,556	5,624	9,317	11,274
Bombay	51,519	42,625	42,864	43,249	9,300	9,633	4,315	4,419	3,689	5,045
Sind	2,791	2,433	2,318	1,789	1,001	887	775	570	712	557
Madras	125,194	104,911	67,179	67,195	20,849	20,474	9,922	9,518	11,503	15,689
Coorg	352	343	201	194	104	86	62	76	79	93
Assam	19,169	16,151	12,605	12,104	5,676	4,984	3,127	2,406	2,932	4,136
Burma	38,769	32,855	13,757	13,886	5,402	5,436	3,703	3,479	4,560	4,226
Ajmer-Merwara	1,103	974	973	881	161	143	132	85	130	145

	20—30 years.		30—40 years.		40—50 years.		50—60 years.		60 years & upwards.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
BRITISH INDIA	205,216	257,241	219,581	207,630	226,516	170,715	227,633	185,405	418,031	391,513
N.-W. F. P.	1,690	1,780	1,778	1,737	1,759	1,353	1,688	1,113	2,655	1,739
Punjab	15,624	15,768	15,797	15,131	16,759	13,527	18,188	14,665	37,555	28,928
Delhi	241	304	216	217	254	186	197	175	418	305
U. P.	34,080	36,068	35,375	34,011	39,663	29,583	43,364	34,212	71,932	61,454
Bihar	30,878	31,016	31,498	27,057	29,327	22,801	29,451	27,568	43,873	47,592
Orissa	7,216	10,650	7,763	8,279	7,667	6,596	8,842	8,711	11,154	13,416
Bengal	48,940	71,407	52,732	46,760	50,693	35,458	44,270	33,128	68,263	58,028
C. P.	14,055	16,603	14,228	12,425	15,467	11,675	15,528	13,643	29,307	30,790
Bombay	10,847	15,449	12,518	12,768	14,753	10,651	15,901	11,756	37,510	37,229
Sind	1,829	1,967	2,337	1,996	2,202	1,398	1,964	971	3,209	1,891
Madras	24,850	36,613	28,317	30,235	31,990	25,020	32,964	27,310	88,583	84,627
Coorg	167	246	186	203	206	143	182	116	179	190
Assam	6,123	9,388	6,949	6,871	6,822	4,782	6,568	4,614	9,430	7,108
Burma	8,392	9,648	9,614	9,677	8,601	7,267	8,034	7,072	18,260	17,671
Ajmer-Merwara	284	334	273	263	353	275	462	351	703	545

M.—Males. F.—Females.

TABLE L.—DEATHS ACCORDING TO AGE IN URBAN AREAS.

	Under one year.		1—5 years.		5—10 years.		10—15 years.		15—20 years.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
BRITISH INDIA . .	113,407	95,190	61,932	59,712	14,406	14,069	8,996	10,429	11,603	16,743
N.-W. F. P. . .	771	573	470	447	126	133	100	116	119	137
Punjab . . .	11,335	9,546	5,918	5,568	1,683	1,607	1,197	1,442	1,371	1,688
Delhi . . .	1,767	1,576	835	839	207	199	159	212	180	320
U. P. . . .	29,256	24,719	14,823	14,561	2,621	2,606	1,580	2,515	1,922	3,793
Bihar . . .	2,334	1,819	1,511	1,319	478	463	369	358	419	504
Orissa . . .	503	480	243	190	71	65	74	63	81	90
Benga . . .	8,915	7,665	4,808	4,525	2,181	1,998	1,517	1,273	1,891	1,861
C. P. . . .	10,598	8,625	6,917	6,293	1,258	1,183	680	804	1,273	2,005
Bombay . . .	15,707	13,438	9,954	9,866	1,523	1,582	801	1,005	1,138	1,764
Sind . . .	2,436	1,989	1,333	1,247	236	206	143	176	227	325
Madras . . .	23,162	19,126	12,910	12,613	3,357	3,353	1,815	1,947	2,230	3,497
Coorg . . .	10	4	16	10	7	8	11	10	17	16
Assam . . .	461	371	191	213	84	79	75	54	74	116
Burma . . .	5,091	4,307	1,443	1,470	509	519	430	381	605	505
Ajmer-Merwara . .	1,061	952	560	551	65	68	45	73	56	122

	20—30 years.		30—40 years.		40—50 years.		50—60 years.		60 years & upwards.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
BRITISH INDIA . .	31,629	38,751	28,971	25,746	29,034	18,945	27,874	18,739	56,952	53,772
N.-W. F. P. . .	277	303	225	212	223	159	238	130	497	404
Punjab . . .	2,083	2,531	1,853	1,861	1,917	1,470	2,077	1,525	4,695	3,589
Delhi . . .	366	616	331	364	370	241	323	227	716	634
U. P. . . .	4,496	8,689	4,303	5,187	4,747	3,580	5,149	3,696	12,663	11,129
Bihar . . .	899	992	878	714	809	468	728	550	1,470	1,293
Orissa . . .	240	252	263	204	279	140	302	173	431	466
Bengal . . .	8,155	6,400	4,762	3,523	4,393	2,938	3,687	2,564	4,537	4,422
C. P. . . .	1,960	2,693	1,948	1,675	1,833	1,251	1,934	1,371	3,987	4,204
Bombay . . .	3,756	5,212	3,964	3,361	4,018	2,384	3,958	2,327	7,912	7,568
Sind	620	733	675	495	749	351	600	295	1,102	890
Madras . . .	6,142	8,395	6,691	6,329	6,970	4,772	6,671	776	15,578	16,175
Coorg . .	84	38	103	28	50	13	28		21	12
Assam . . .	235	225	253	140	220	81	200	96	264	181
Burma . . .	2,169	1,409	2,579	1,508	2,278	1,003	1,759	892	2,736	2,471
Ajmer-Merwara . .	147	263	143	145	168	94	220	106	343	334

M.—Males. F.—Females.

TABLE M.—INFANTILE MORTALITY RATE IN THE LARGER TOWNS.

Towns.	Rates p. m. live-births.
N.-W. F. Province.	
Peshawar	164·2
Dera Ismail Khan	119·4
Delhi.	
Delhi City	170·3
New Delhi	71·3
United Provinces.	
Dehra	212·9
Saharanpur	301·5
Hardwar Union	302·3
Muzaffarnagar	195·4
Meerut	138·7
Khurja	277·1
Aligarh	230 5
Hathras	285·7
Muttra	193·8
Agra	184·0
Bareilly	148·4
Budaun	220·9
Moradabad	181·4
Amroha	204·4
Sambhal	227·6
Shahjahanpur	176·8
Pilibhit	240·5
Farrukhabad-*cum*-Fatehgarh	247·5
Etawah	292·2
Cawnpore	322·7
Allahabad	203·5
Jhansi	266·7
Benares	235·4
Mirzapur-Bindhachal	211·5
Jaunpur	200·1
Gorakhpur	225·7
Lucknow	224·4
Fyzabad-Ajodhya	169·6
Bahraich	185·0
Bengal Presidency.	
Asansol	134·2
Bankura	138·6
Hooghly-Chinsura	154·7
Serampur	149·2
Howrah	287 8
South Suburban	159·8
Baranagar	219·6
Titagarh	257·0
Naihati	135·6
Bhatpara	220·7
Calcutta	241·6
Serajganj	171·9
Dacca	224·4
Narayanganj	237·6
Mymensingh	375·3
Barisal	181·6
Chittagong	202·5
Central Provinces.	
Nagpur	283·5
Jubbulpore	270·9
Saugor	297·0
Khandwa	314·1
Burhanpur	273·6
Raipur	231 6
Bilaspur	233·8
Amraoti	209·0
Akola	294·1
Bombay Presidency.	
Bombay	250·2
Jalgaon	167·9
Dhulia	138·6
Surat	308·1
Broach	148·1
Nadiad	311·7
Godhra	239·0
Ahmedabad	303·4
Ahmednagar	138·0
Poona	296·9
Nasik	356·4
Malegaon	174·0
Bandra	161·8
Kurla	247·3
Belgaum	124·1
Gadag-Bettigeri	163·9
Bijapur	132·1
Sholapur	205·5
Sind.	
Karachi	167·0
Hyderabad	198·2
Sukkur	107·9
Shikarpur	235·9

TABLE M.—INFANTILE MORTALITY RATE IN THE LARGER TOWNS—*contd.*

Towns.	Rates p. m. live-births.	Towns.	Rates p. m. live births.
Madras Presidency.		*Madras Presidency*—contd.	
Bellary	184 5	Vellore	167·8
Adoni	129·7	Virudhunagar	215·6
Conjeevaram	154·8	Srivilliputtur	210·7
Saidapet	188·0	Salem	168·1
Coimbatore	142·2	Cuddalore	177·2
Erode	166·7	Tanjore	169·9
Cocanada	211·9	Kumbakonam	158·7
Rajahmundr	261·4	Negapatam	212 7
Guntur	163·5	Mayavaram	145·2
Tenali	152·0	Tuticorin	205·7
Bezwada	279·4	Tinnevelly	221·8
Masulipatam	235·1	Palamcottah	172·1
Madras	218·3	Trichinopoly	167·5
Madura	199·2	Vizagapatam	194 0
Dindigul	153·3	Vizianagram	163·1
Calicut	111·1	*Burma.*	
Palghat	165·9	Akyab	186·0
Cannanore	101·0	Rangoon	243·2
Tellicherry	119·7	Bassein	286·3
Nellore	143·8	Moulmein	240·4
		Mandalay	234·6

TABLE N.—INFANITLE MORTALITY. IN RURAL AND URBAN AREAS.

	Rural.		Urban.	
	Deaths.	Rate p. m. live-births.	Deaths.	Death p. m. live-births.
British India	**1,412,219**	**157·0**	**208,597**	**211·6**
N.-W. F. P.	8,028	120•6	1,344	129·2
Punjab	153,263	157·4	20,881	166·5
Delhi	1,681	174 6	3,343	157·5
U. P.	226,384	139·2	53,975	206·4
Bihar	130,817	117·4	4,153	138·0
Orissa	49,668	199·4	983	174·6
Bengal	269,376	169·6	16,580	195·4
C. P.	133,813	233·0	19,223	249·8
Bombay	94,144	153·7	29,145	224·2
Sind	5,224	98·8	4,425	165·9
Madras	230,105	152·4	42,288	281·9
Coorg	695	199·7	14	32·6
Assam	35,320	151·4	832	131·0
Burma	71,624	195·3	9,398	195·5
Ajmer-Merwara	2,077	135·8	2,013	245·3

Appendix II

relating to

Section II-Chief diseases.

TABLE A.—DEATHS AND RATES P. M. FROM CHIEF GROUP OF DISEASES.

	Cholera.		Small-pox.		Plague.		Fevers.		Dysentery and Diarrhœa.		Respiratory Diseases.		Other causes.		Total.	
	Deaths.	Rate p. m.	Deaths.	Rate p. m.	Deaths.	Rate p. m.	Deaths.	Rate p. m.	Deaths.	Rate p. m.	Deaths.	Rate p. m.	Deaths.	Rate p. m.	Deaths.	Rate p. m.
BRITISH INDIA	159,720	0·6	104,805	0·4	13,021	0·05	3,593,497	12·7	281,666	1·0	493,441	1·8	1,729,581	6·1	6,375,731	22·6
N.-W. F. P.	68	0·03	85	0·03	...	...	33,889	13·6	305	0·1	3,027	1·2	4,883	2·0	42,257	16·95
Punjab	1,721	0·06	2,613	0·1	153	0·05	374,817	14·7	11,771	0·4	56,971	2·2	114,246	4·5	562,292	22·0
Delhi	48	0·07	217	0·3	...	...	9,307	13·6	616	0·9	3,524	5·1	2,609	3·8	16,321	23·8
U. P.	6,793	0·1	14,849	0·3	7,290	0·1	851,847	16·5	16,677	0·3	42,978	0·8	154,248	3·0	1,094,677	21·2
Bihar	6,070	0·2	22,863	0·7	1,245	0·04	549,006	16·0	3,118	0·1	3,169	0·1	116,343	3·4	701,814	20·5
Orissa	7,977	1·1	3,789	0·5	...	...	97,672	13·6	16,283	2·3	4,921	0·7	62,946	8·8	193,588	27·0
Bengal	76,100	1·5	46,267	0·9	1	0·0	716,142	13·9	57,212	1·1	94,817	1·8	232,185	4·5	1,222,724	23·7
C. P.	10,691	0·6	2,318	0·1	835	0·1	285,992	17·3	42,324	2·6	45,094	2·8	146,397	8·9	534,551	32·4
Bombay	11,304	0·6	4,320	0·2	578	0·03	161,150	8·4	30,104	1·6	111,113	5·8	178,709	9·3	497,278	26·0
Sind	8	0·0	308	0·1	4	0·0	27,679	6·6	1,303	0·3	10,225	2·4	8,898	2·1	48,425	11·5
Madras	34,117	0·7	4,581	0·1	615	0·01	271,668	5·8	84,313	1·8	93,842	2·0	534,703	11·5	1,023,839	22·0
Coorg	2	0·0	31	0·2	17	0·1	2,952	17·9	167	1·0	187	1·1	549	3·3	3,905	23·7
Assam	3,816	0·5	963	0·1	...	...	97,240	11·6	11,113	1·3	6,425	0·8	36,044	4·3	155,601	18·6
Burma	984	0·1	1,354	0·1	2,283	0·2	104,976	8·1	5,863	0·5	13,870	1·1	135,043	10·5	264,373	20·6
Ajmer-Merwara	21	0·0	247	0·4	...	...	9,160	15·7	497	0·8	2,383	4·1	1,778	3·0	14,086	24·1

TABLE B.—DEATHS FROM CHOLERA FROM 1905 TO 1936.

Year.	British India.	N.-W. F.P.	Punjab.	Delhi.	U. P.	Bihar	Orissa.	Bengal.	C. P.	Bombay.	Sind.	Madras.	Coorg.	Assam.	Burma.	Ajmer-Merwara.	Indian States. Rajputana.	Central India.	Hyderabad.	Mysore.
1905—1909.	2,371,365	3,545	20,354	324	399,144	555,350		677,816	61,011	89,644		422,658	410	95,927	44,897	285	5,926	13,366	2,227	16,600
1910—1914.	1,767,770	5,421	17,643	503	331,970	394,482		451,025	78,258	96,929		289,444	254	81,967	19,800	74	6,219	25,896	9,210	17,672
1915—1919.	2,098,749	5,557	25,030	242	346,359	598,862		453,864	110,998	97,606		321,297	191	99,088	38,713	942	7,970	15,652	26,647	13,062
1920—1924.	1,069,136	4,390	22,843	781	228,540	229,512		276,455	72,680	25,793		131,845	34	54,379	21,805	79	3,911	6,826	9,254	8,023
1925 .	115,645	116	3,049	50	7,653	17,336		34,276	124	57		44,815	4	6,233	1,932	...	...	43	22	...
1926 .	138,151	...	87	18	6,166	27,268		59,106	4,565	73		24,407	2	10,275	6,182	2	4	269	26	6
1927 .	304,710	2	11,286	16	28,285	49,022		118,377	16,311	26,153		35,334	...	15,392	4,528	4	1,357	2,584	8,913	1,367
1928 .	351,305	...	2,034	34	44,941	77,103		136,245	12,198	6,881		57,677	...	6,915	7,209	68	1,371	7,520	4,314	413
1929 .	295,434	30	2,309	193	50,924	104,034		81,090	6,168	9,084		25,846	1	7,765	7,970	20	722	1,155	450	140
1930 .	337,322	449	1,181	8	61,334	155,215		54,963	23,250	15,142		18,746	...	6,332	661	41	2,101	11,165	18,369	535
1931 .	220,909	105	391	61	31,118	40,943		79,073	14,135	18,646		30,232	116	5,523	534	32	294	1,411	5,653	6,385
1932 .	67,219	70	614	4	9,734	9,348		33,910	854	1,353		5,278	...	4,971	1,082	1	122	168	71	83
1933 .	68,318	...	160	...	1,915	17,514		29,242	2,152	7,797		3,851	...	5,508	179	...	35	642	4,838	90
1934 .	199,708	...	178	19	31,903	57,289		50,742	27,329	11,362		18,158	1	1,904	822	1	969	4,471	4,951	346
1935 .	217,162	245	714	181	10,412	64,876		59,605	20,140	11,235		35,456	...	7,436	6,858	4	33	1,043	10,553	1,407
1936 .	159,72	68	1,721	48	6,793	6,070	7,977	76,100	10,691	11,304	8	34,117	2	3,816	984	21	776	604	9,065	1,793

Table C.—Deaths and rates p. m. from Cholera in rural and urban areas.

	Deaths.			Rate p. m.			No. of anti-cholera inoculations.	Total villages.	Number infected.
	R.	U.	Total.	R.	U.	Total.			
British India	146,944	12,776	159,720	0·6	0·5	0·6	6,287,781	462,567	31,937
N.-W. F. P.	67	1	68	0·03	0·003	0·03	7,653	2,802	15
Punjab	1,367	354	1,721	0·06	0·1	0·06	196,109	34,877	287
Delhi	3	45	48	0·01	0·09	0·07	7,323	304	1
U. P.	5,976	817	6,793	0·1	0·1	0·1	202,318	105,640	1,272
Bihar	5,910	160	6,070	0·2	0·1	0·2	288,930	67,879	2,349
Orissa	7,814	163	7,977	1·1	0·7	1·1	170,399	19,435	1,689
Bengal	72,246	3,854	76,100	1·5	1·1	1·5	2,211,678	86,361	15,998
C. P.	9,624	1,067	10,691	0·7	0·6	0·6	413,380	39,246	1,485
Bombay	10,704	600	11,304	0·7	0·2	0·6	444,514	21,455	1,979
Sind	8	...	8	0·002	...	0·0	665	9,095	1
Madras	28,549	5,568	34,117	0·7	1·4	0·7	1,952,872	34,588	5,090
Coorg	2	...	2	0·01	...	0·0	...	298	1
Assam	3,766	50	3,816	0·5	0·2	0·5	167,583	28,333	1,432
Burma	896	88	984	0·08	0·06	0·1	206,608	11,515	325
Ajmer-Merwara	12	9	21	0·03	0·05	0·0	17,749	739	13

Table D.—Deaths from Cholera by months.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
British India	10,878	7,675	15,684	22,082	12,367	9,641	9,686	11,783	10,157	10,139	18,006	21,622
N.-W. F. P.	34	...	...	...	...	...	...	...	...	...	16	18
Punjab	1	2	1	8	58	323	442	711	136	24	15	...
Delhi	...	1	1	...	3	25	4	8	3	3	...	...
U. P.	12	24	88	364	1,206	1,582	900	822	695	484	427	189
Bihar	199	199	226	488	728	773	564	787	494	464	737	411
Orissa	128	181	364	539	1,186	971	627	598	372	306	1,104	1,601
Bengal	4,779	4,157	12,884	19,224	7,144	2,373	1,492	1,073	1,071	2,283	7,089	12,531
C. P.	3	42	188	125	445	1,008	1,504	2,544	2,693	1,385	448	806
Bombay	306	98	61	78	221	909	1,345	1,775	1,721	1,803	1,668	1,319
Sind	...	...	...	...	...	...	6	2	...	...	...	...
Madras	4,863	2,757	1,679	963	820	1,244	2,279	3,140	2,671	3,071	6,014	4,616
Coorg	...	...	...	...	...	...	...	...	...	...	2	...
Assam	366	110	79	183	441	339	349	270	296	293	470	617
Burma	187	104	113	110	115	94	159	47	5	20	16	14
Ajmer-Merwara	...	...	...	...	...	...	15	6	...	...	...	...

R.—Rural. U.—Urban.

TABLE E.—DEATHS FROM PLAGUE BY MONTHS.

(i) British Provinces.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.	Rate p.m.	No. of anti-plague inoculations.
GRAND TOTAL .	1,736	2,283	2,979	2,192	693	272	430	814	786	775	1,305	2,737	17,002	...	..
BRITISH INDIA .	1,337	1,889	2,569	1,822	582	168	193	352	423	401	964	2,321	13,021	0·05	488,095
N.-W. F. P. . .	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Punjab . . .	...	3	17	78	53	...	...	...	...	1	...	1	153	0·05	25,625
Delhi . . .	...	...	...	...	...	...	...	...	...	...	...	...	...	...	5
U. P. . . .	588	917	1,547	1,376	453	133	48	88	138	133	451	1,418	7,290	0·1	127,487
Bihar . . .	160	240	401	174	48	6	10	5	7	11	43	140	1,245	0·04	24,252
Orissa . . .	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Bengal . . .	...	...	...	...	...	...	1	...	...	...	...	...	1	0·0	...
C. P. . . .	21	65	125	61	1	...	4	28	99	83	146	202	835	0·1	27,176
Bombay . . .	82	102	87	32	6	3	3	16	66	59	43	79	578	0·03	41,738
Sind . . .	...	...	4	...	...	...	...	...	...	...	...	...	4	0·0	473
Madras . . .	50	45	41	28	1	...	47	105	53	23	93	129	615	0·0	62,173
Coorg . . .	5	...	...	2	...	1	...	2	1	3	1	2	17	0·1	8,125
Assam . . .	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Burma . . .	431	517	347	71	20	25	80	108	59	88	187	350	2,283	0·2	171,041
Ajmer-Merwara .	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

(ii) Indian States and Agencies.

TOTAL .	401	395	412	370	111	104	237	462	363	374	341	416	3.986
Punjab . . .	...	...	...	80	40	...	...	...	...	...	...	...	120
U. P. . . .	...	...	...	...	...	...	...	...	...	...	...	...	...
Eastern States Agency	...	...	...	...	...	...	...	...	...	...	...	...	...
Deccan States Agency & Kolhapur Residency . .	24	15	40	68	14	9	59	53	31	25	29	29	396
Madras . . .	...	...	...	...	...	24	2	...	...	...	...	...	26
Mysore . . .	93	66	53	32	35	45	128	234	163	166	165	192	1,372
Bangalore C. & M. Station . .	...	...	...	...	...	...	...	1	2	...	...	...	3
Hyderabad . . .	242	255	243	171	17	18	33	154	152	166	122	176	1,749
C. I. Agency . .	40	58	73	15	...	...	...	...	4	3	15	7	215
Baroda . . .	...	...	...	...	...	...	...	...	...	...	...	...	...
Rajputana . .	...	...	...	...	...	...	...	...	...	...	...	...	...
Assam . . .	...	...	...	...	...	...	...	...	...	...	...	...	...
Burma . . .	2	1	...	1	4	7	15	20	11	14	10	12	97
Jammu & Kashmir	...	...	3	3	1	1	...	...	...	...	...	...	8
Baluchistan	...	...	...	...	...	...	...	...	...	...	...	...	...

TABLE F.—DEATHS AND RATES P. M. FROM SMALLPOX IN RURAL AND URBAN AREAS.

	Deaths.			Death rate p. m.			Deaths in children.			Percentage of deaths to total mortality from small pox.	
	R.	U	Total.	R.	U.	Total.	Under 1 year.	1—10 years.	Total.	Under 1 year.	1—10 years.
British India	87,414	17,391	104,805	0·3	0·6	0·4	13,503	23,862	37,365	13·1	23·1
N.-W. F. P.	72	13	85	0·03	0·04	0·03	25	46	71	29·4	54·1
Punjab	2,063	550	2,613	0·09	0·2	0·1	746	1,302	2,048	28·5	49·8
Delhi	9	208	217	0·04	0·4	0·3	81	111	192	37·3	51·2
U. P.	13,119	1,730	14,849	0·3	0·3	0·3	2,713	3,509	6,222	8·3	23·6
Bihar	21,857	1,006	22,863	0·7	0·7	0·7	1,946	3,55	5,497	8·5	15·5
Orissa	3,752	37	3,789	0·5	0·2	0·5	247	427	674	6·5	11·3
Bengal	36,349	9,918	46,267	0·8	2·8	0·9	4,361	10,039	14,463	9·4	21·8
C. P.	1,511	807	2,318	0·1	0·4	0·1	701	1,030	1,731	30·2	44·4
Bombay	2,633	1,632	4,320	0·2	0·4	0·2	1,176	1,899	3,075	27·2	44·0
Sind	220	88	308	0·06	0·1	0·1	46	133	179	14·9	43·2
Madras	3,831	750	4,581	0·09	0·2	0·1	1,232	1,327	2,559	26·9	29·0
Coorg	31	...	31	0·2	...	0·2	8	23	31	25·8	74·2
Assam	899	64	963	0·1	0·3	0·1	107	111	218	11·1	11·5
Burma	829	525	1,354	0·07	0·4	0·1	111	294	405	8·2	21·7
Ajmer-Merwara	234	13	247	0·6	0·07	0·4	Not available			Not available	

TABLE G.—DEATHS FROM SMALLPOX BY MONTHS.

	Jan.	Feb.	Mar.	April.	May.	June.	July	Aug.	Sept.	Oct.	Nov.	Dec.
BRITISH INDIA	7,749	11,453	16,001	20,258	18,768	11,752	6,798	3,456	1,890	1,432	1,873	3,375
N.-W. F. P.	7	12	2	3	1	18	8	1	3	...	6	24
Punjab	234	251	264	232	393	331	192	114	25	54	139	384
Delhi	20	29	24	20	22	16	3	3	1	7	13	59
U. P.	1,393	1,687	2,027	2,683	3,081	1,947	1,011	451	144	74	89	262
Bihar	1,636	2,114	2,971	4,369	5,206	2,883	1,478	787	391	234	283	511
Orissa	363	460	479	513	475	417	359	224	96	92	112	199
Bengal	2,370	4,770	8,011	10,285	7,916	5,112	2,915	1,323	803	576	814	1,372
C. P.	337	471	342	402	381	206	106	24	14	7	5	23
Bombay	493	732	913	880	552	277	175	107	57	48	43	43
Sind	35	40	40	48	35	16	19	8	14	9	10	34
Madras	695	673	542	467	358	279	357	288	246	232	217	227
Coorg	...	...	4	2	9	6	2	4	1	...	2	1
Assam	83	94	94	105	126	95	77	52	57	41	57	82
Burma	43	89	235	215	172	122	86	65	38	58	82	149
Ajmer-Merwara	40	31	53	34	41	27	10	5	...	...	1	5

R.—Rural. U.—Urban.

TABLE H.—DEATHS AND RATES P. M. FROM FEVERS AND MALARIA IN RURAL AND URBAN AREAS.

	Fever deaths.			Death rate p. m.			Reported malaria deaths.		
	R.	U.	Total.	R.	U.	Total.	R.	U.	Total.
British India	3,393,431	200,066	3,593,497	13·0	7·4	12·7	1,494,469	72,615	1,567,084
N.-W. F. P.	31,194	2,695	33,889	14·4	8·1	13.6	@	71*	71
Punjab	346,754	28,063	374,817	15·6	8·3	14·7	157,144	11,783	168,927
Delhi	4,089	5,218	9,307	19·5	11·0	13·6	12	46	58
U. P.	789,595	62,252	851,847	17·2	10·7	16·5	720,237	31,475	751,712
Bihar	540,297	8,709	549,006	16·4	6·3	16·0	@	1,054*	1,054
Orissa	96,148	1,524	97,672	13·9	6·8	13·6	@	679*	679
Bengal	701,645	14,497	716,142	14·6	4·1	13·9	335,500	2,147	337,647
C. P.	263,236	22,756	285,992	17·9	12;6	17·3	255,174	19,496	274,670
Bombay	141,619	19,531	161,150	9·2	5·3	8·4	25,594	1,713	27,307
Sind	25,223	2,456	27,679	7·3	3·4	6·6	808	819	1,627
Madras	245,946	25,722	271,668	5·8	6·6	5·8	@	1,182*	1,182
Coorg	2,906	46	2,952	18·7	4·9	17·9	...	...	...
Assam	96,261	979	97,240	11·8	4·7	11·6	@	139*	139
Burma	100,395	4,581	104,976	8·8	3·2	8·1	@	1,930*	1,930
Ajmer-Merwara	8,123	1,037	9,160	20·2	5·7	15·7	@	81*	81

* For Municipal towns only.

@ Not available.

TABLE I.—DEATHS FROM FEVERS BY MONTHS.

	Jan.	Feb.	Mar.	Apl.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
British India	293,003	259,414	271,502	283,312	314,336	284,405	270,118	303,557	304,571	316,330	325,082	367,867
N.-W. F. P.	3,695	3,105	2,972	2,460	2,810	2,935	2,424	2,236	2,113	2,647	2,915	3,577
Punjab	31,153	30,262	30,418	27,731	37,266	34,681	27,707	30,768	28,549	29,092	32,914	33,676
Delhi	700	620	603	712	1,069	887	739	924	821	811	787	634
U. P.	65,251	58,797	57,720	66,523	79,383	75,102	62,647	70,632	79,046	85,201	76,007	75,538
Bihar	40,555	36,190	40,514	44,813	53,083	44,912	39,605	50,294	46,715	46,878	47,552	57,895
Orissa	7,169	7,413	8,261	7,103	5,761	6,048	7,411	8,579	8,140	7,767	9,080	14,340
Bengal	66,292	55,505	60,996	60,945	53,837	49,223	51,127	53,088	54,300	57,439	69,886	83,504
C. P.	20,239	17,744	18,508	20,465	28,570	20,241	20,699	27,352	29,777	28,397	26,396	27,604
Bombay	13,136	12,014	13,209	14,247	14,456	11,215	12,879	15,103	13,262	13,897	13,326	14,406
Sind	3,302	3,031	3,070	2,495	2,243	1,685	1,613	1,745	1,675	2,092	2,461	2,267
Madras	22,310	19,823	20,519	19,828	19,680	20,235	23,057	24,699	23,191	22,661	24,399	30,666
Coorg	183	180	270	258	286	383	301	264	239	210	186	197
Assam	8,678	6,862	6,290	7,439	8,669	9,393	8,846	8,032	7,735	7,970	8,159	9,167
Burma	9,531	7,021	7,288	7,576	6,217	6,898	9,808	8,931	8,283	10,606	9,801	13,616
Ajmer-Merwara	809	847	864	722	1,006	567	655	910	725	662	618	780

R.—Rural. U.—Urban.

TABLE J.—DEATHS AND RATES P. M. FROM DYSENTERY AND DIARRHŒA IN RURAL AND URBAN AREAS AND BY SEX.

	Deaths.					Rate per mille.		
	R.	U.	Total.	M.	F.	R.	U.	Total.
British India	223,825	57,841	281,666	146,697	134,969	0·9	2·1	1·0
N. W. F. P.	107	198	305	168	137	0·05	0·6	0·1
Punjab	7,818	3,953	11,771	6,310	5,461	0·4	1·2	0·4
Delhi	105	511	616	328	288	0·5	1·1	0·9
U. P.	4,461	12,216	16,677	8,591	8,086	0·1	2·1	0·3
Bihar	2,454	664	3,118	1,760	1,358	0·07	0·6	0·1
Orissa	15,673	610	16,283	8,450	7,833	2·2	2·7	2·3
Bengal	50,039	7,173	57,212	30,040	27,172	1·0	2·0	1·1
C. P.	36,350	5,974	42,324	21,731	20,593	2·5	3·3	2·6
Bombay	24,153	5,951	30,104	15,637	14,467	1·6	1·6	1·6
Sind	256	1,047	1,303	711	592	0·07	1·4	0·3
Madras	67,979	16,334	84,313	43,286	41,027	1·6	4·2	1·8
Coorg	112	55	167	100	67	0·7	5·8	1·0
Assam	10,658	455	11,113	6,010	5,103	1·3	2·2	1·3
Burma	3,658	2,205	5,863	3,324	2,539	0·3	1·5	0·5
Ajmer-Merwara	2	495	497	251	246	0·05	2·7	0·8

TABLE K.—DEATHS FROM DYSENTERY AND DIARRHŒA BY MONTHS.

	Jan.	Feb.	Mar.	Apl.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
British India.	18,774	16,047	17,493	20,137	20,381	20,738	27,544	33,086	29,168	25,645	24,460	28,193
N.-W. F. P.	17	22	22	15	21	14	27	45	24	43	23	32
Punjab	798	643	699	886	1,325	1,290	1,150	1,374	1,149	990	796	671
Delhi	21	20	30	53	69	49	71	115	59	54	44	81
U. P.	807	596	805	1,373	1,948	1,836	1,787	2,045	1,673	1,440	1,311	1,056
Bihar	185	161	169	225	257	270	430	521	276	260	167	197
Orissa	1,267	1,264	1,405	1,053	926	1,167	1,742	1,695	1,425	1,200	1,352	1,787
Bengal	4,195	3,693	4,895	6,847	5,426	4,016	4,295	4,026	4,131	4,542	5,225	5,921
C. P.	1,900	1,538	1,659	1,720	1,819	1,886	3,671	7,595	7,858	5,679	3,742	3,257
Bombay	1,471	1,338	1,287	1,484	1,719	2,195	3,706	5,102	3,882	3,035	2,489	2,396
Sind	80	55	73	111	145	107	114	156	144	110	107	101
Madras	6,831	5,815	5,618	5,159	5,006	5,916	8,479	8,558	7,029	6,700	7,814	11,888
Coorg	5	3	5	8	16	40	19	27	11	7	13	13
Assam	752	559	476	742	1,177	1,339	1,114	963	951	1,116	1,029	895
Burma	424	332	321	405	447	594	886	777	510	430	322	415
Ajmer-Merwara	21	8	29	56	80	19	53	87	46	39	26	33

R.—Rural, U.—Urban.

TABLE L.—DEATHS AND RATES P. M. FROM RESPIRATORY DISEASES IN RURAL AND URBAN AREAS AND BY SEX.

	Deaths.					Rate p. m.					Reported deaths from pulmonary tuberculosis.	
	R.	U.	Total.	M.	F.	R.	U.	Total.	M.	F.	R.	U.
British India	333,765	159,676	493,441	280,857	212,584	1·3	5·9	1·8	1·9	1·6	...	...
N.-W. F. P.	1,645	1,382	3,027	1,760	1,267	0·8	4·1	1·2	1·3	1·1	†	286*
Punjab	43,234	13,737	56,971	32,234	24,737	1·9	4·1	2·2	2·3	2·1	9,894	2,175
Delhi	1,226	2,298	3,524	1,983	1,541	5·8	4·8	5·1	5·0	5·3	108	476
U. P.	7,510	35,463	42,973	22,949	20,024	0·2	6·1	0·8	0·8	0·8	256	5,929
Bihar	2,397	772	3,169	1,860	1,309	0·07	0·6	0·1	0·1	0·2	†	9*
Orissa	4,545	376	4,921	2,810	2,111	0·7	1·7	0·7	0·8	0·6	†	7*
Bengal	76,688	18,129	94,817	60,193	34,624	1·6	5·1	1·8	2·2	1·4	11,128	4,138
C. P.	37,618	8,376	45,994	26,534	19,460	2·6	4·6	2·8	3·2	2·4	1,945	629
Bombay	77,902	33,211	111,113	60,107	51,006	5·0	9·0	5·8	6·1	5·5	17,673	6,919
Sind	4,715	5,510	10,225	6,007	4,218	1·4	7·5	2·4	2·5	2·3	485	1,099
Madras	66,444	27,398	93,842	51,232	42,610	1·6	7·1	2·0	2·2	1·8	†	6,365*
Coorg	79	108	187	120	67	0·5	11·4	1·1	1·3	0·9	...	...
Assam	5,984	441	6,425	3,814	2,611	0·7	2·1	0·8	0·9	0·7	†	91*
Burma	3,772	10,098	13,870	8,051	5,819	0·3	7·1	1·1	1·2	0·9	†	2,757*
Ajmer-Merwara	6	2,377	2,383	1,203	1,180	0·02	13·0	4·1	3·9	4·3	†	577*

* Municipalities only.

†Not available

TABLE M.—DEATHS FROM RESPIRATORY DISEASES BY MONTHS.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
British India	46,719	44,462	44,202	40,709	38,904	35,081	36,936	39,964	37,670	40,111	40,631	48,052
N.-W. F. P.	377	325	325	211	219	253	249	189	154	210	211	304
Punjab	7,662	6,997	5,489	4,434	4,343	3,544	3,436	3,717	3,371	4,066	4,078	5,834
Delhi	420	376	340	299	308	239	224	273	215	247	233	350
U. P.	4,435	3,883	3,625	3,789	40,91	3,077	2,746	3,527	3,320	3,310	3,433	3,787
Bihar	248	253	373	258	304	227	284	254	249	231	207	281
Orissa	416	427	457	396	347	382	446	452	403	381	354	460
Bengal	9,395	9,593	9,898	8,778	6,919	6,487	6,282	6,345	6,324	6,809	8,367	9,620
C. P.	3,466	3,302	3,367	3,614	3,931	3,080	3,446	4,409	4,427	4,681	3,955	4,316
Bombay	8,714	8,505	9,609	9,340	9,070	8,327	9,367	10,281	9,201	9,728	8,830	10,141
Sind	1,493	1,747	1,626	933	690	530	376	459	429	466	644	832
Madras	8,064	7,179	7,283	6,863	6,927	7,175	8,103	8,017	7,617	7,936	8,500	10,178
Coorg	31	9	4	15	15	13	16	18	8	18	16	24
Assam	557	592	541	555	512	501	534	564	518	510	509	532
Burma	1,206	1,037	1,072	1,058	966	1,092	1,276	1,267	1,283	1,269	1,102	1,242
Ajmer-Merwara	235	237	193	166	262	154	151	192	151	249	192	201

R.—Rural. U.—Urban.

TABLE N.—QUININE AND CINCHONA FEBRIFUGE ISSUED BY THE PUBLIC HEALTH, MEDICAL, AND OTHER DEPARTMENTS IN THE VARIOUS PROVINCES OF BRITISH INDIA DURING 1936.

	Quinine.		Cinchona febrifuge.	
	Total issues in lbs.	Grains per head of population.	Total issues in lbs.	Grains per head of population.
British India	**55,045**	**1·4**	**26,468**	**0·7**
N.-W. F. P.	1,582	4·4	780	2·2
Punjab*	3,230	0·9	517	0·1
Delhi	372	3·8	132	1·3
U. P.	11,828	1·6	6,199	0·8
Bihar	2,199	0·4	100	0·02
Orissa	1,421	1·4	532	0·5
Bengal	12,361	1·7	11,653	1·6
C. P.	4,322	1·8	930	0·4
Bombay	5,943	2·2	215	0·08
Sind	1,521	2·5	150	0·2
Madras	3,583	0·5	1,101	0·2
Coorg	340	14·5	267	11·3
Assam	1,852	1·6	1,474	1·2
Burma	4,386	2·4	2,352	1·3
Ajmer-Merwara	105	1·3	66	0·8

*In addition 18,000 tablets of quinine of unknown weight were distributed

Appendix III

relating to

Section III.

TABLE A.—MATERNAL DEATH RATES PER 1,000 LIVE-BIRTHS RECORDED IN CERTAIN TOWNS.

	1936. Deaths.	1936. Rate p. m.
Delhi.		
Delhi City	97	5·4
Delhi Ntd. Area	29	28·5
United Provinces.		
Lucknow	77	6·5
Agra	72	5·3
Cawnpore	107	8·3
Allahabad	66	7·3
Benares	160	13·0
Moradabad	62	9·7
Aligarh	25	6·7
Bareilly	35	5·4
Saharanpur	82	18·8
Hathras	14	5·4
Muttra	26	7·9
Muzaffarnagar	18	11·3
Meerut	32	7·3
Jhansi	17	4·3
Central Provinces.		
Nagpur	123	11·0
Amraoti	89	37·4
Raipur	28	15·0
Burhanpur	37	17·4
Akola	26	11·7
Jubbulpore	60	9·1
Khamgaon	14	14·0
Bombay Presidency.		
Bombay City	182	5·1
Ahmedabad	109	6·3
Surat	42	6·8
Poona	35	5·3
Nasik	3	2·6
Sholapur	90	12·8
Satara	5	8·3
Ahmednagar	16	7·0
Sind.		
Karachi	79	5·7
Sukkur	33	12·9
Shikarpur	56	25·0
Hyderabad	17	4·0
Larkana	31	30·0
Madras Presidency.		
Chingleput	19	23·9
Tanjore	81	28·3
Guntur	75	26·3
Nellore	63	25·1
Negapatam	44	26·4
Nandyal	6	6·7
Anantapur	12	21·2
Mayavaram	19	16·9
Kurnool	21	13·3
Cuddapah	13	13·8
Kumbakonam	41	16·9
Tinnevelly	27	13·0
Cuddalore	46	21·2
Trichinopoly	73	14·5
Conjeeveram	15	6·5
Calicut	42	10·7
Rajahmundry	30	14·2
Palamcottah	31	16·7
Madura	135	15·5
Vellore	40	13·5
Cocanada	17	8·6
Tuticorin	32	13·2
Bezwada	44	16·0
Ellore	24	10·3
Madras	294	10·2
Burma.		
Mandalay	72	8·9
Moulmein	32	17·5
Rangoon Town	63	5·8
Myingyan	19	17·2
Akyab	16	21·1
Prome	9	8·0
Pegu	11	13·5
Coorg.		
Mercara	3	15·4

TABLE B.—MATERNITY AND CHILD WELFARE CENTRES IN RURAL AND URBAN AREAS.

	Centres maintained by: Govt.		Local and Municipal bodies.		Other Agencies.		Total.		Trained visitors.		Trained midwives.		Trained *dais*.	
	R.	U.	R.	U.	R.	U.	R.	U.	R.	U.	R.	U.	R.	U.
British India	10	9	218	215	113	268	341	492	52	244	1,316	1,342	3,780	1,991
N.-W. F. P.	..	2	..	..	..	1	..	3	..	3	..	3	20	5
Punjab	..	1	15	18	8	31	23	50	25	50	..	21	270	596
Delhi	..	..	7	15	1	3	8	18	1	16	7	5	1	30
U. P.	..	..	61	56	60	80	121	136	..	22	124	179	174	399
Bihar	..	6	..	4	4	6	4	16	..	7	4	12	..	4
Orissa	..	..	2	5	..	1	2	6	..	3	12	18	9	13
Bengal	4	..	6	18	3	14	13	32	2	11	26	76	2,970	460
C. P	..	..	..	7	16	48	16	55	13	51	4	2	34	324
Bombay	..	..	17	14	2	20	19	34	1	14	28	139	265	104
Sind	..	..	19	5	5	7	24	12	..	8	15	23	27	41
Madras	4	..	88	64	12	23	104	87	8	35	958	710	7	..
Coorg	..	..	..	..	..	1	..	1	..	..	..	..	3	..
Assam	..	..	3	2	..	3	3	5	..	5	2	19	..	5
Burma	2	..	..	4	2	30	4	34	2	18	136	134	..	..
Ajmer-Merwara	..	..	..	3	..	..	..	3	..	1	..	1	..	10

Appendix IV

relating to

Section IV.

TABLE A.—EXPENDITURE ON PUBLIC HEALTH DURING 1936-37.

(i) *By the Government of India.*

	India general.	Baluchistan.	Other areas.	Total.
	Rs.	Rs.	Rs.	Rs.
Total	15,32,443	11,328	4,72,557	20,16,328
Public Health Establishment	1,92,213	8,828	1,79,659	3,80,700
Grants for Public Health Purposes	2,62,793	2,500	39,000	3,04,293
Expenses in connection with epidemic diseases	1,02,479	..	2,51,506	3,53,985
Bacteriological Laboratories	2,34,825	..	..	2,34,825
Pasteur Institutes	1,441	..	..	1,441
Works	7,38,692	..	2,392	7,41,084

(ii) *By the Provincial Governments.*

	Total.	Public Health establish-ment.	Grants for public health purposes.	Epidemic Diseases.	Bacteriological Laboratory.	Pasteur Institutes.	Works.
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Total	1,49,88,549	63,36,912	45,02,709	17,65,553	8,61,434	3,38,944	11,82,997
N.-W. F. P.	1,32,678	1,00,940	12,915	18,823	..	..	..
Punjab	10,99,459	6,69,386	2,21,778	1,64,346	19,778	24,171	..
U. P.	21,79,675	14,61,964	4,52,957	2,01,618	..	..	63,136
Bihar	10,00,461	4,82,876	1,41,191	1,39,411	24,341	13,689	1,98,953
Orissa	1,99,696	91,797	48,562	30,390	3,690	1,120	24,137
Bengal	34,28,475	6,99,587	22,72,141	3,25,765	87,708	39,912	3,362
C. P.	3,58,385	82,718	51,069	2,21,883	2,715	..	..
Bombay	22,44,937	6,63,061	2,52,634	1,40,336	2,94,219	30,482	8,64,205
Sind	2,06,550	1,26,806	49,769	28,096	..	1,879	..
Madras	23,76,498	12,52,687	5,81,459	1,03,136	4,00,851	34,955	3,410
Coorg	22,563	2,771	5,000	8,043	..	..	6,749
Assam	7,09,648	3,27,679	64,378	1,65,062	12,824	1,24,909	14,796
Burma	9,93,713	3,38,901	3,48,856	2,18,572	15,308	67,827	4,249
Shan States Federation	35,811	35,739	..	72	..	..	..

TABLE B.—DISTRIBUTION OF HEALTH STAFFS IN RURAL AND URBAN AREAS.

Rural Areas.

	Medical Officers of Health.				Epidemic Staff.	Sanitary and Health Inspectors.	Vaccinators.		School Medical Officers.	Other Health Staffs
	Holding D. P. H.		Licentiates (L. P. Hs.)				M.	F.		
	Whole time.	Part time.	Whole time.	Part time.						
Total	149	1	108	...	782	1,280	6,399	50	16	894
N. W. F. P.	...	...	...	...	2	...	24	...	...	2
Punjab	28	...	...	...	98	49	447	...	...	16
Delhi	...	1	...	...	...	2	3	...	5	13
U. P.	44	...	32	...	46	150	821	...	...	...
Bihar	10	...	8	...	150	75	980	1	9	129
Orissa	4	...	1	...	21	39	324	4	2	11
Bengal	29	...	46	...	259	554	1,825	37	...	579
C. P.	...	...	...	...	37	...	267	...	...	35
Bombay	2	...	...	...	47	4	303	...	...	51
Sind	...	...	1	...	...	1	75	1	...	...
Madras	28	...	18	...	46	305	604	7	...	...
Coorg	...	...	1	...	...	1	7	...	...	...
Assam	...	...	...	...	45	...	415	...	...	...
Burma	4	...	1	...	31	*90	304	...	...	2
Ajmer-Merwara	...	...	...	...	...	10	...	...	...	56

*Includes 25 Inspectors of vaccination.

Urban Areas.

	Medical Officers of Health.				Sanitary and Health Inspectors.	Vaccinators.		Inspectors of Vaccination.	School Medical Officers.	Other Health Staffs.
	Holding D. P. H.		Licentiates (L. P. Hs.)			M.	F.			
	Whole time.	Part time.	Whole time.	Part time.						
Total	135	9	101	20	1,199	1,040	44	88	69	539
N. W. F. P.	1	...								
Punjab	14	4	...	...	8	5	1	6	5	...
Delhi	1	3	...	18	127	131	13	3	9	70
U. P.	21		...	...	16	11	...	...	3	22
Bihar	8	...	13	...	194	185	...	...	13	...
Orissa	2	1	1	...	94	74	2	9	...	31
Bengal	22	...	2	1	12	11	1	3	...	9
C. P.	2	...	1	1	108	170	13	6	24	95
Bombay	14	...	1	...	75	83	...	...	...	3
Sind		...	48	...	98	49	...	1	8	235
Madras	7	...	...	...	22	10	2	1	...	...
Coorg	26	...	29	...	287	172	12	17	6	...
Assam	...	...	...	...	2	2	...	1	...	...
Burma	1	...	...	...	15	36	...	41	...	17
Ajmer-Merwara	15	1	6	...	128	94	...	...	1	57
	1	...	...	...	13	7	...	...	...	...

Appendix V

relating to

Section VI.

TABLE A.—VACCINATION OPERATIONS PERFORMED IN BRITISH INDIA AND IN DIFFERENT PROVINCES DURING 1936-37.

Province.	Population.	Operations performed.			Percentage of success.		Children successfully vaccinated.		Total cost.	Average cost per successful case.	Rate of successful vaccinations per 1,000 of population.	Percentage of annual births successfully vaccinated.
		P.	R.	Total.	P.	R.	Under 1 year.	1 to 6 years.				
									Rs.	Rs. A. P.		
British India	**271,089,217**	**11,047,662**	**13,683,979**	**24,731,641**	**99**	**50**	**4,461,882**	**4,502,726**	**33,13,502**	**0 3 7**	**56**	**45**
N.-W. F. P.	3,762,678	148,891	110,123	259,014	98	84	78,826	50,288	26,487	0 1 11	60	102
Punjab	23,460,267	1,040,407	2,508,674	3,549,081	99	66	804,202	146,922	3,86,065	0 2 8	98	73
Delhi	636,246	27,927	66,044	93,971	98	63	21,316	4,116	9,338	0 2 9	86	69
U. P.	48,408,763	1,637,317*	284,975*	1,922,292	98	46	1,061,652	445,331	3.88,228	0 3 8	35	56
Bihar	32,372,799	983,725	602,408	1,586,143	99	56	273,466	560,142	59,081	0 0 10	36	24
Orissa	7,990,297	226,165	376,841	603,006	94	64	67,845	116,273	69,766	0 3 1	45	27
Benga	50,114,002	3,255,573	6,011,800	9,267,373	95	52	378,437	1,318,375	4,03,857	0 1 4	102	23
C. P.	15,323,080	529,390	114,387	643,777	97	52	399,083	90,284	2,04,018	0 6 1	35	61
Bombay	18,033,928	605,269	223,522	828,791	100	43	436,987	124,259	4,56,040	0 11 10	36	59
Sind	3,887,070	123,710	51,402	175,112	100	36	64,871	46,000	1,00,760	0 13 8	30	82
Madras	44,342,192	1,403,254	2,085,722	3,488,976	95	22	613,045	547,704	6,72,043	0 6 11	35	37
Coorg	163,327	5,615	6,718	12,333	96	60	1,171	3,479	5,809	0 10 2	56	30
Assam	8,932,228	394,847	359,823	754,670	88	67	51,687	238,414	82,069	0 2 6	59	22
Burma	13,102,048	643,537	878,215	1,521,752	99	36	191,128	308,674	4,41,727	0 8 4	65	46
Ajmer-Merwara	560,292	22,025	3,325	25,350	96	93	18,166	2,465	8,214	0 5 5	43	77

P = Primary.
R = Revaccinations.

*Excluding 12,620 vaccinations (315 primary and 12,305 revaccinations) performed by military medical officers in cantonments.

Appendix VI

relating to

Section VII.

TABLE A.—NUMBER OF TOWNS HAVING WATER SUPPLIES IN DIFFERENT PROVINCES.

	Towns having a population of over 50,000.		Towns having a population of 30,000—50,000.		Towns having a population below 30,000.		Total.			
	No. of towns.	Towns having a protected water supply.	No. of towns.	Towns having a protected water supply.	No. of towns.	Towns having a protected water supply.	No. of towns.	Aggregate population.	Towns having a protected water supply.	Population of towns included in col. 10.
1	2	3	4	5	6	7	8	9	10	11
BRITISH INDIA	78	61	86	46	1,134	143	1,298	24,813,817	250	12,996,981
N.-W. F. P.	1	1	1	1	15	6	17	299,284	8	206,293
Punjab	8	6	10	5	158	23	176	2,915,248	34	1,418,930
Delhi	2	2	...	...	4	3	6	447,442	5	439,180
U. P.	17	11	13	3	409	8	439	5,439,339	22	1,656,378
Bihar	6	4	6	4	57	2	69	1,495,138	10	760,243
Orissa	1	...	2	2	5	...	8	216,806	2	75,318
Bengal	4	4	17	15	96	32	117	2,295,835	51	1,427,868
C. P.	2	2	7	4	103	3	112	1,679,546	9	550,338
Bombay	7	7	12	3	111	15	130	3,798,587	25	2,419,484
Sind	4	3	...	...	23	1	27	684,857	4	439,607
Madras	22	18	16	8	43	14	81	3,674,755	40	2,573,039
Coorg	...	...	...	...	2	1	2	9,827	1	5,995
Assam	...	...	...	...	31	10	31	229,825	10	111,879
Burma	3	3	2	1	73	24	78	1,447,129	28	891,032
Ajmer-Merwara	1	...	...	..		1	5	180,199	1	21,397

Appendix VII

relating to

Section VIII.

List of Scientific Papers by Research workers under the Government of India, the Indian Research Fund Association, Provincial Governments and Indian States published during 1936.

A.—(i) Papers published in the Indian Journal of Medical Research (I. J. M. R.)

Aykroyd, W. R., and Krishnan, B. G.

An investigation of cheap 'well-balanced' diets. (Volume XXIII, No. 3).
The carotene and vitamin-A requirements of children. (Volume XXIII, No. 3).
Stomatitis due to vitamin-B2 deficiency. (Volume XXIV, No. 2).

Aykroyd, W. R., and Rajagopal, K.

The state of nutrition of school children in South India. Part I. (Volume XXIV, No. 2).

Aykroyd, W. R., and Sankaran, G.

The growth of embryonic nervous tissue in plasma taken from vitamin-A deficient fowls and rats. (Volume XXIII, No. 4).

Bagchi, K. N., and Mazumdar, N. S.

Importance of phytosteryl acetate test in detecting hydrogenated fats in ghee. (Volume XXIV, No. 1).

Basu, C. C., and Chatterjee, H. N.

Studies in the serology of syphilis. (Volume XXIII, No. 3).

Basu, K. P., and Mukherjee, S.

Biochemical investigations on different varieties of Bengal rice. Part III. Enzymic digestibility of rice starch and protein; Action of salivary and pancreatic amylase as well as of pepsin and trypsin. (Volume XXIII, No. 3).

Enzymic digestibility of pulses: Action of salivary and pancreatic amylase and of the proteolytic enzymes pepsin and trypsin.

Basu, K. P., Nath, M. C., and Ghani, M. O.

Biological value of the proteins of green gram (*Phaseolus mungo*) and lentil (*Lens esculenta*). Part I. By the balance sheet method. (Volume XXIII, No. 3).

Biological value of the proteins of green gram (*Phaseolus mungo*) and lentil (*Lens esculenta*). Part II. Measured by the growth of young rats. (Volume XXIII, No. 3).

Biswas, M. M.

Influence of antibody formation on the pseudoglobulin fraction of normal serum. (Volume XXIV, No. 2).

Bose, J. P., and De, U. N.

Cholesteremia in normal and diabetic Indian subjects. (Volume XXIV, No 2).

Chakraborty, R. K., and Roy, A. N.

The relation between the composition of the diet and the urinary excretion of ascorbic acid. (Volume XXIII, No. 3).

Chaudhuri, H., and Kahali, B. S.

The rate of absorption of glucose from the gastro-intestinal tract of the cat and the influence of insulin on the absorption coefficient. (Volume XXIII, No. 4).

Chopra, R. N., Chowhan, J. S., and De. N.

Pharmacological action of camphor and its derivatives. (Volume XXIV, No. 1).

Chopra, R. N., Chowhan, J. S. and Gupta, J. C.

Biological assay of digitalis preparations in the tropics. Part VI. Comparative effects of *digitalis lanata* Ehrh. from Austria and Kashmir, and standard digitalis powder (B. P. 1932) on the Mammalian heart. (Volume XXIV, No. 2).

Chopra, R. N., Das. N. N., and Mukherjee, S. N.

A study on the activation of tissue-growth (*in vitro*) with cobra venom. (Volume XXIV, No. 1).

Chopra, R. N., Ghosh, S., and Dutt. A. T.

Some inorganic preparations of the Indian indigenous medicine. Part II. *Banga Bhasma* (calcined tin). (Volume XXIV, No. 1).

Some inorganic preparations of the Indian indigenous medicine. Part III. *Lauha Bhasma* (calcined iron). (Volume XXIV, No. 2).

Chopra, R. N., and Roy, A. C.

Some observations on the Indophenol (2 : 6 dichlorophenol-indophenol) reducing properties of urine. (Volume XXIV, No. 1).

On the colorimetric determination of lipoid phosphorous (lecithin) in the blood. (Volume XXIV, No. 2).

On the determination of small quantities of Atebrin in the blood. (Volume XXIV, No. 2).

Covell, G.

Studies on typhus in the Simla hills. Part I. Introduction. (Volume XXIII, No. 3).

Studies on typhus in the Simla hills. Part II. The Weil-Felix reaction in wild rats. (Volume XXIII, No. 3).

Studies on typhus in the Simla hills. Part III. A strain of typhus recovered from wild rats. (Volume XXIII, No. 3).

Studies on typhus in the Simla hills. Part V. Attempts to establish strains of typhus from human sources. (Volume XXIV No. 1).

Covell, G., and Mehta, D. R.

Studies on typhus in the Simla hills. Part IV. The role of the rat flee in the transmission of typhus. (Volume XXIII, No. 4).

Studies on typhus in the Simla hills, Part VI. The role of the human body-louse in the transmission of typhus. (Volume XXIV, No. 2).

Covell, G., McGuire, J. P., Stephens, E. D., and Lahiri, B. N.

Notes on antirabic immunization. (Volume XXIV, No. 2).

Das Gupta, B. M.

Some observations on vaginal *Trichomonas* (*T. fœtus*) and the *Trichomonas* in the digestive tract of cows in culture. (Volume XXIV, No. 2).

An abnormal *Entamœba coli* cyst in the monkey (*Silenus rhesus*). (Volume XXIV, No. 2).

De, N. K.

The carotene content of some Indian vegetable foodstuffs with a preliminary note on its variation due to storage. Parts I—II. (Volume XXIII, No. 4).

A comparative study of some properties of carotene and lycopene. (Volume XXIII, No. 4).

Factors affecting the carotene content of certain vegetable foodstuffs. (Volume XXIV, No. 1).

Dey, N. C., and Maplestone, P. A.

Favus in India. (Volume XXIII, No. 3).

Ganguly, S. N.

Studies on Indian snake venoms. Part III. Enzymes in daboia and cobra venoms. (Volume XXIV, No. 1).

Studies on Indian snake venoms. Part IV. Mechanism of the coagulent action of daboia venom on blood. (Volume XXIV, No. 2).

Ganguly, S. N., and Melkana, M. T.

Studies on Indian snake venoms. Part I. daboia venom : its chemical composition, protein fractions, and their physiological actions. (Volume XXIII, No. 4).

Studies on Indian snake venoms. Part II. cobra venom ; its chemical composition, protein fractions, and their physiological actions. (Volume XXIV, No. 1).

Ghose, B. N.

The Absorption of antigens by anti-bodies or *vice versa*. Part II. (Volume XXIII, No. 4).

Goyle, A. N., Vasudevan, A., and Krishnaswamy, K. G.

Carcinoma of the thymus. (Volume XXIV, No. 1).

Knowles, R., and Das Gupta, B. M.

Some observations on the intestinal protozoa of Macaques. (Volume XXIV, No. 2).

Krishnan, K. V.

Spontaneous tuberculosis in laboratory monkeys. (Volume XXIII, No. 3).

Linton, R. W., and Mitra, B. N.

Vibrio polysaccharides. (Volume XXIV, No. 2).

Linton, R. W., Mitra, B. N., and Mullick, D. N.

Respiration and glycolysis of the cholera-like vibrios. (Volume XXIII, No. 3).

A study of the metabolism of two hundred and ten vibrio strains. (Volume XXIV, No. 2).

Linton, R. W., Mitra, B. N., and Seal, S. C.

Further notes on the cholera and cholera-like vibrios. (Volume XXIII, No. 3).

Agglutination in the vibrios. Part I. The effect of heat on chemical structure and surface potential. (Volume XXIV, No. 1).

Agglutination in the vibrios. Part II. The effect of salt and sera. (Volume XXIV, No. 2).

Mallick, S. M. K.

The use of tapioca in immunization with snake venoms. (Volume XXIII, No. 4).

Maplestone, P. A., and Mukerji, P. K.

An improved technique for the isolation of ascaris eggs from soil. (Volume XXIII, No. 3).

Menon, K. P., and Seetharama Iyer, P. V.

The viability of the 'infective' forms of the larvæ of *Wuchereria bancrofti* when found from the mosquito host. (Volume XXIII, No. 4).

Mitra, B. N.

Racemization of the proteins of *vibrio cholerœ* and related organisms. Part I. The diamino acids. (Volume XXIII, No. 3).

Racemization of the proteins of *vibrio cholerœ* and related organisms. Part II, The monoamino acids. (Volume XXIII, No. 3).

Nucleic acid of proteins of *vibrio cholarœ* and related organisms. (Volume XXIV, No. 1).

The absorption spectra of the proteins of *vibrio cholerœ* and related organisms. (Volume XXIV, No. 1).

Mitra, P. N.

Blood groups of the angami naga and the lushai tribes. (Volume XXIII, No. 3).

Moitra, N. M.

A note on the isolation of three new types of dysentery bacteriophage. (Volume XXIV, No. 2).

Moorthy, V. N., and Sweet, W. C.

A peculiar type of guinea-worm embryo. (Volume XXIV, No. 2).

Muir, E. and Chatterji, S. N.

A study of nerve leprosy. (Volume XXIV, No. 1).

Napier, L. E., and Das Gupta, C. R.

Hæmatological studies in Indians. Part V. Red blood cell measurements. (Volume XXIII, No. 4).

Narasimhamurthy, G.

The chemical nature of vitamin B_1. (Volume XXIV, No. 1).

Pal, R. K.

Action of Lugol's iodine solution on the thyroxinized heart. (Volume XXIII, No. (4).

The humoral transmission of the effects of cardiac vagus and sympathetic stimulation by drugs. (Volume XXIV, No. 1).

Pandit, C. G., Maitra, N. M., and Datta Roy, B. K.

On inhibition of individual types of cholera Bacteriophage by vibrio extracts. (Volume XXIV, No. 1).

Pandit, C. G., Rice, E. M.

An epidemic of cholera in Mondair village (Habiganj sub-division, Assam). (Volume XXIV, No. 1).

Pandit, C. G., Rice, E. M., Neal, W. J. L. and Ghosh, N. K.

A statistical and bacteriological analysis of a cholera epidemic in Manipur State, Assam. (Volume XXIV, No. 1).

Pandit, S. R.

The proteus group: Observations on 25 strains maintained at the King Institute, Madras. (Volume XXIII, No. 4).

Pillai, M. J. S.

The study of epiphyseal union for determining the age of south Indians. (Volume XXIII, No. 4).

Radhakrishna Rao, M. V.

Cirrhosis of the liver following chronic intoxication with carbon tetrachloride: An experimental study. (Volume XXIII, No. 4).

Studies on vitamin-A deficiency. Part I. Xerophthalmia and trigeminal nerve degeneration. (Volume XXIV, No. 2).

Raghavachari, T. N. S., and Seetharama Iyer, P. V.

A comparative study of certain selective media used in water analysis together with a review of the literature on the subject. (Volume XXIII, No. 3).

The sterilization of drinking water with minimal doses of chlorine. (Volume XXIV, No. 1).

Rahman, S. A.

The basal metabolism of young men at Hyderabad (Deccan) with a study of their physical characters. (Volume XXIV, No. 1).

Ranganathan, S.

Further studies on the effect of storage on the vitamin-C potency of foodstuffs. (Volume XXIII, No. 3).

Ranganathan, S., and Sankaran, G.

Migration of ascorbic acid (vitamin-C) in an electrical field. (Volume XXIV, No. 1).

Sanjiva Rao, R., Pandit, C. G., and Shortt, H. E.

Cultivation of vaccinia virus on the chorio-allantoic membrane of the chick-embryo. (Volume XXIII, No. 4).

Sankaran, G., and Krishnan, B. G.

Observations on the heart rate in vitamin-B and C deficiency. (Volume XXIII, No. 3).

Sankaran, G., and Rajagopal, K.

Studies in carbohydrate metabolism. Part I. A micro-electrometric method of blood-sugar determination. (Volume XXIV, No. 2).

Shortt, H. E.

Life-history and morphology of *Babesia canis* in the dog-tick *Rhipicephalus sanguineus*. Parts I—II. (Volume XXIII, No. 4).

Shrott, H. E., Sanjiva Rao, R., and Swaminath, C. S.

Cultivation of the viruses of sandfly fever and dengue fever on the chorio-allantoic membrane of the chick-embryo. (Volume XXIII, No. 4).

Smith, R. O. A., Chiranji Lal, Mukerjee, S., and Halder, K. C.

The transmission of *L. donovani* by the bite of the sand-fly *P. argentipes*. (Volume XXIV, No. 1).

Smith, R. O. A., Mukerjee, S., and Chiranji Lal.

Bionomics of *P. argentipes*. Part II. The breeding sites of *P. argentipes* and an attempt to control these insects by anti-larval measures. (Volume XXIV, No. 2).

Smith, R. O. A., Mukerjee, S., Haldar, K. C., and Chiranji Lal.

Bionomics of *P. argentipes*. *Part I.* The duration of life in nature. (Volume XXIV, No. 1).

Sundar Rao, S.

Filariasis in Patnagarh (Orissa Feudatory State). (Volume XXIII, No. 4).

The effect of gastric juice and of bile on cyclops infected with guinea-worm larvæ. (Volume XXIV, No. 2).

Surie, Ella.

Biological assay of vitamin-A in the diet of Indians. (Volume XXIII, No. 3).

Taylor, J., Ahuja, M. L., and Gurkirpal Singh.

Experimental observations on cholera vaccine. (Volume XXIII, No. 3).

Taylor, J., and Mallick, S. M. K.

The action of rattlesnake and mocassin venoms as compared with Indian viper venoms. (Volume XXIV, No. 1).

Taylor, J., Mallick, S. M. K., and Ganguly, S. N.

Preservation of coagulant solutions of daboia venom. (Volume XXIV, No. 2).

Taylor, J., Read, W. D. B., and Pandit, S. R.

Fermentation reaction of vibrios. (Volume XXIV, No. 2).

Tirumurthi, T. S., and Radhakrishna Rao, M. V.

The role of malaria in the causation of cirrhosis of the liver. (Volume XXIV, No. 1).

Ukil, A. C., and Guha Thakurta, S. R.

A comparative study of culture and animal inoculation as methods for isolating tubercle bacilli from pathological materials. (Volume XXIV, No. 1).

Wilson, H. E. C., Ahmed, B., and Mazumdar, B. N.

Further observations on the metabolism of carotene. (Volume XXIV, No. 2).

Wilson, H. E. C., Ahmad, B., and Mullick, D. N.

A diet of some families and institutions in Calcutta. (Volume XXIV, No. 1).

A.—(ii) Papers published in the Records of the Malaria Survey of India.

Chowdhury, K. L.

Three years' (1933 to 1935) malaria control work in Calcutta. (Volume VI, No. 3).

Covell, G., and Baily, J. D.

Malaria in Sind. Part XV. The effects produced by the operation of the Lloyd Barrage Scheme on the incidence of malaria in Sind. (Volume VI, No. 3).

Further observations on a regional epidemic of malaria in northern Sind. (Volume VI, No. 3).

Dikshit, B. B.

Pharmacological action of plasmoquine. (Volume VI, No. 3).

Ebden, J. A. W., and Satyanarayana, K.

A brief report on the mosquito control work in Vizagapatam port. (Volume VI, No. 4).

Hicks, E. P., and Diwan Chand.

Transport and control of *aedes aegypti* in aeroplanes. (Volume VI, No. 1).

A mosquito survey of Karachi Air Port. (Volume VI, No. 4).

Kghar, N. D.

The effect of vitamin deficiency on antibody production and resistance to infection. (Volume VI, No. 3).

Some physico-chemical factors and their relationship to protein fractions, blood cells and parasite counts in the blood sera of monkeys infected with *Plasmodium knowlesi*. (Volume VI, No. 3).

Krishnan, K. V., Ghosh, B. M., and Bose, P. N.

Cholesterol changes in monkey malaria and haemoglobinuria. (Volume VI, No. 1).

Molony, J. B. de W., and Gorman, J. H.

Malaria in Quetta. An analysis of the statistics of admissions to military hospitals, and their correlation with temperature, humidity and rainfall. (Volume VI, No. 2).

Mulligan, H. W., and Baily, J. D.

Malaria in Quetta, Baluchistan. (Volume VI, No. 2).

Mulligan, H. W., and Majid, S. A.

Some notes on the care, transportation and use of *Gambusia affinis* under Indian conditions. (Volume VI, No. 4).

Mulligan, H. W., and Puri, I. M.

Description of *Anopheles* (*Anopheles habibi*) n. sp. from Quetta, Baluchistan. (Volume VI, Nos. 1 and 3).

Neogi, S. K.

Study of the bionomics of *Anopheles sundaicus* (*A. ludlowi*) in the salt lakes of Calcutta. (Volume VI, No. 1).

Relation of the salinity of the breeding places of *Anopheles sundaicus* with the endemicity of malaria in the suburban areas of Calcutta. (Volume VI, No. 2).

Paul, S. H., Das, G. S., and Roy, S. C.

A brief preliminary report of the malaria survey of Haltugaon in the District of Goalpara, Assam. (Volume VI, No. 3).

Prashad, B., and Hora, S. L.

A general review of the probable larvivorous fishes of India. (Volume VI, No. 4).

Puri, I. M.

The distribution of anopheline mosquitoes in India: Additional records, 1931—1935. (Volume VI, No. 2).

Ramsay, G. C., Chandra, S. N., and Lamprell, B. A.

A record of an investigation to determine the androphilic indices of certain anopheline mosquitoes collected on tea estates in Assam and northern Bengal. (Vol. VI, No. 1).

Rao, B. A., and Cheluvarayan, C.

Mass treatment and prophylaxis with atebrin. (Volume VI, No. 3).

Rice, E. M., Dutta, S. B., and Bell, F. G.

A description of the larva of *anopheles gigas* var. *bailevi*. (Volume VI, No. 1).

Rice, E. M., and Mohan, B. N.

A. minimus in Assam, its cold weather bionomics and their relationship to anti-larval control. (Volume VI, No. 4).

Seeling, S. F., and Wadhawa Singh.

A clinical study of the effects of treating malaria with atebrin and atebrin musonate. (Volume VI, No. 2).

Senior White, R.

Malaria control by subsoil drainage at Waltair. (Volume VI, No. 1).

Williamson's 'herbage cover' method of larval control. A preliminary note on some field trials. (Volume VI, No. 3).

Senior White, R., Lal, R. B., Adhikari, A. K., and Swaroop, S.

Some experiments with an automatic mosquito-catching machine: The Entoray. (Volume VI, No. 4).

Sinton, J. A.

Malarial prevalence in its relationship to the problems of food supply and increasing population in India. (Volume VI, No. 1).

What malaria costs India, nationally, socially and economically. (*Concld.*). (Volume VI, No. 1).

Viswanathan, D. K.

Epidemic malaria in Madras Presidency. (Volume VI, No. 2).

Wats, R. C., and Bilderbeck, C. L.

Some experiments with 'Entoray' machine as an anti-mosquito measure. (Volume VI, No. 4).

B.—Papers published in the Indian Medical Gazette during 1936—Volume LXXI.

Acharya, B. G. S., and Jaswal, J. N.

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Appendix VIII

relating to

Section IX.

TABLE A.—NUMBER OF HOSPITALS AND DISPENSARIES AT WORK IN BRITISH INDIA AND DIFFERENT PROVINCES.

	Classes I, III and IV.		Classes II and VI.		Class V.		Total.		Grand Total.	Average population served by each institution.	
	R.	U.	R.	U.	R.	U.	R.	U.		R.	U.
British India	4,039	1,456	364	476	384	180	4,787	2,112	6,899	53,349	12,905
N.-W. F. P.	44	22	12	13	3	8	59	43	102*	36,585	7,775
Punjab	597	187	87	82	3	5	687	274	961	32,284	12,327
Delhi	5	22	..	2	..	..	5	24	29	41,997	19,825
U.P.	294	208	18	93	57	21	369	322	691	124,330	17,999
Bihar	391	63	33	32	60	7	484	102	586	67,990	13,588
Orissa	136	14	13	5	8	2	157	21	178	44,181	10,630
Bengal	930	186	47	76	125	51	1,102	313	1,415	43,695	11,255
C. P.	115	120	12	41	37	15	164	176	340	89,681	10,287
Bombay	113	214	19	43	17	22	149	279	428	103,860	13,169
Sind	83	66	2	10	1	11	86	87	173	40,369	8,425
Madras	1,002	192	54	22	62	32	1,118	246	1,364	38,166	15,749
Coorg	9	2	..	..	..	..	9	2	11	17,247	4,737
Assam	178	40	26	22	6	2	210	64	274	38,805	3,242
Burma	132	96	36	30	2	2	170	128	298	66,919	11,187
Baluchistan	10	24	5	5	3	2	18	31	49	@	@

* Excluding 36 dispensaries in the Agencies.
@ Not available.
R.—Rural. U.—Urban.

TABLE B.—NUMBER OF BEDS IN HOSPITALS AND DISPENSARIES.

	All classes of Institutions.			State-public, local fund and private aided hospitals and dispensaries.		
	Males.	Females and Children.	Total.	Males.	Females and Children.	Total.
British India	48,448	28,319	76,767	38,068	23,889	61,957
N.-W. F. P.	1,758	512	2,270	897	407	1,304
Punjab	6,532	4,238	10,770	5,682	4,153	9,835
Delhi	589	713	1,302	531	713	1,244
U. P.	6,119	3,097	9,216	4,391	2,758	7,149
Bihar	3,402	1,726	5,128	2,291	1,273	3,564
Orissa	835	350	1,185	759	343	1,102
Bengal	6,902	3,223	10,125	4,357	2,549	6,906
C. P.	1,858	1,214	3,072	1,413	919	2,332
Bombay	4,346	3,190	7,536	3,631	2,723	6,354
Sind	780	569	1,349	780	569	1,349
Madras	7,199	6,462	13,661	6,414	4,775	11,189
Coorg	88	66	154	88	66	154
Assam	1,301	445	1,746	791	365	1,156
Burma	6,208	2,368	8,576	5,512	2,130	7,642
Baluchistan	531	146	677	531	146	677

TABLE C.—NO. OF BEDS FOR FEMALES IN GENERAL AND FEMALE HOSPITALS AND DISPENSARIES OF CLASSES I, III AND IV.

	General hospitals.	Female hospitals.	Total.	Female hospitals.	
				Total in-door patients treated.	In-door daily average.
Total	16,542	6,203	23,110	167,040	4,977·13
N.-W. F. P.	291	116	407	4,167	151·73
Punjab	2,835	1,318	4,153	26,945	978·04
U. P.	1,296	1,462	2,758	32,287	975·69
Bihar	1,086	187	1,273	3,402	147·88
Orissa	339	4	343	76	3·83
Bengal	2,116	433	2,549	11,821	219·65
C. P.	601	318	919	9,381	323·30
Bombay	2,180	543	2,723	19,995	508·60
Sind	215	354	569	9,664	297·26
Madras	3,542	1,233	4,775	43,708	1,338·95
Assam	*	*	365	*	*
Burma	1,926	204	2,130	4,863	13·00
Baluchistan	115	31	146	731	19·20

*Not available.

TABLE D.—SURGICAL OPERATIONS DONE IN CLASSES I, III AND IV INSTITUTIONS.

	Operations performed during the year.		Cured.	Died.
	Principal.	Secondary.		
British India	2,638,780	101,460	2,453,845	8,867
N.-W. F. P.	104,544	3,796	102,089	168
Punjab	596,623	10,097	556,392	1,131
Delhi	27,775*	..	..	707
U. P.	338,008	11,912	306,052	1,361
Bihar	273,520	4,972	263,873	468
Orissa	43,082	242	42,498	105
Bengal	192,233	29,406	179,367	951
C. P.	109,666	1,905	107,289	298
Bombay	126,406	2,717	95,820	1,043
Sind	51,868	2,452	50,172	212
Madras	599,617	14,462	581,767	1,549
Coorg	5,381	..	5,291	9
Assam	25,386	74	24,999	78
Burma	129,285	19,241	123,004	764
Baluchistan	15,386	184	15,232	23

* Including Secondary.

TABLE E.—INCOME OF HOSPITALS AND DISPENSARIES.

	Total income Classes I, III and IV institutions.	Contributions by	
		Government.	Municipal and local funds.
	Rs.	Rs.	Rs.
British India	4,84,33,625	1,94,99,584	1,52,99,169
N.-W. F. P.	7,18,668	3,94,139	2,27,101
Punjab	52,67,228	20,97,595	24,01,859
Delhi	11,30,561	4,47,020	4,23,750
U. P.	38,93,454	10,34,934	17,65,220
Bihar	33,29,313	8,91,623	13,43,582
Orissa	8,32,893	3,80,530	3,42,848
Bengal	81,15,167	23,02,782	26,45,478
C. P.	27,73,566	7,35,521	3,03,350
Bombay	55,73,505	23,72,066	18,55,365
Sind	13,30,341	4,31,718	3,27,691
Madras	77,69,246	52,02,486	16,69,720
Coorg	1,14,055	48,697	58,679
Assam	11,45,318	5,13,276	3,67,799
Burma	62,38,815	24,62,022	15,64,097
Baluchistan	2,01,495	1,85,175	14,630

TABLE F.—EXPENDITURE ON THE MAINTENANCE OF HOSPITALS AND DISPENSARIES.

	Total Expenditure.	Expenditure on			
		Medical officers.	Nurses.	Diet.	Medicines.
	Rs.	Rs.	Rs.	Rs.	Rs.
British India	4,04,41,492	1,01,45,967	39,69,676	32,91,571	50,68,060
N.-W. F. P.	6,96,834	1,93,321	39,212	32,540	92,243
Punjab	51,32,145	15,26,553	3,18,758	1,49,578	6,13,050
Delhi	10,42,406	1,43,895	2,04,068	58,271	1,17,166
U. P.	32,56,267	9,30,602	2,43,290	1,63,033	4,93,600
Bihar	24,81,051	6,68,336	1,30,863	1,56,538	4,09,833
Orissa	7,50,087	2,67,347	34,030	38,605	1,03,043
Bengal	65,26,461	12,70,433	6,98,548	5,83,881	8,37,458
C. P.	13,56,492	2,51,046	31,310	25,474	14,49
Bombay	48,79,421	11,30,176	5,80,935	4,56,168	5,33,171
Sind	9,77,778	2,99,421	94,753	55,727	1,06,256
Madras	76,46,590	18,10,077	9,29,120	10,25,325	11,83,774
Coorg	1,14,055	37,717	8,739	10,986	23,230
Assam	9,65,496	3,62,276	1,04,890*	54,949	1,28,603
Burma	43,82,000	11,66,234	5,44,739	4,73,032	3,92,984
Baluchistan	2,34,409	88,533	6,421	7,464	18,800

*Including expenditure on compounders.

TABLE G.—ACCOMMODATION IN MENTAL HOSPITALS.

	Number.	Accommodation.			Maximum confined.			Square feet per head.
		M.	F.	Total.	M.	F.	Total.	
British India	19	7,262	2,214	9,476	8,257	2,545	10,802	..
Punjab	1	826	182	1,008	842	222	1,064	70
U. P.	3	1,037	355	1,392	1,055	311	1,366	50
Bihar	2	1,267	409	1,676	1,166	383	1,549	50—288
C. P.	1	344	126	470	382	104	486	54
Bombay	5	1,095	554	1,649	1,493	723	2,216	50—140
Sind	1	203	45	248	204	37	241	74
Madras	3	900	254	1,154	1,549	463	2,012	16—50
Assam	1	566	124	690	571	127	698	50
Burma	2	1,024	165	1,189	995	175	1,170	36—87

TABLE H.—ADMISSIONS, POPULATION, DAILY AVERAGE STRENGTH, DAILY AVERAGE SICK, CURES AND DEATHS AMONGST MENTAL HOSPITAL CASES.

	Admitted.	Population.			Cured.	Died.	Average strength.	Average sick.	Criminal insanes.
		M.	F.	Total.					
British India	2,955	10,160	3,091	13,251	1,488	690	10,352·91	756·99	2,717
Punjab	149	966	247	1,213	90	37	1,033·56	67·06	193
U. P.	434	1,310	375	1,685	199	107	1,290·44	71·61	408
Bihar	198	1,280	435	1,715	94	38	1,527·32	77·57	545
C. P.	85	446	118	564	46	38	473·83	20·88	159
Bombay	836	2,006	894	2,900	393	203	2,106·20	78·20	155
Sind	94	275	42	317	52	23	228·10	20·40	33
Madras	739	1,990	611	2,601	257	127	1,937·76	323·35	329
Assam	124	657	140	797	55	42	681·25	60·30	272
Burma	296	1,230	229	1,459	302	75	1,074·45	27·62	623

M.—Males. F.—Females.

TABLE I.—TYPES OF INSANITY TREATED IN MENTAL INSTITUTIONS.

	Punjab.	U. P.	Bihar.	C. P.	Bombay.	Sind.	Madras.	Assam.	Burma.	Total.
Total	1,222	1,685	1,715	564	2,900	317	2,598	797	1,459	13,257
Mental deficiency	107	140	83	59	204	21	218	7	90	929
Manic depressive insanity	335	45	187	58	270	42	102	148	16	1,203
Mania	77	269	159	109	601	107	401	226	368	2,317
Melancholia	65	244	175	62	590	46	140	119	245	1,686
Schizophrenia including dementia praecox	222	137	355	87	373	15	835	171	258	2,453
Secondary dementia	168	54	118	7	193	6	139	3	53	741
Paranoia and paranoid states	37	68	167	25	183	32	101	12	41	666
Epilepsy and epileptic insanity	111	110	88	45	91	12	160	42	48	707
Toxic psychosis—										
(*a*) Acute confusional insanity	15	180	35	15	42	9	30	1	61	388
(*b*) Alcoholic psychosis	1	22	31	3	42	1	84	..	21	205
(*c*) Canabis indica psychosis	58	261	105	5	141	23	130	66	21	810
(*d*) Of endocrine origin	..	..	3	5	..	..	7	..	3	18
(*e*) In relation to child bearing	7	44	..	15	33	..	45	1	9	154
(*f*) In relation to other constitutional diseases	2	22	3	2	38	..	35	..	1	103
Organic psychosis—										
(*a*) General	..	2	4	..	11	..	36	..	129	182
(*b*) Cerebral syphilis	..	48	5	2	1	1	21	..	3	81
(*c*) Arteriopathic and senile psychosis	1	5	19	27	18	..	72	..	34	176
(*d*) Encephalitis	7	..	1	..	..	..	..	..	4	12
(*e*) Other cerebral lesions	1	..	4	..	20	..	4	..	4	33
Neurosis and psycho-neurosis	..	6	39	1	15	..	5	1	3	70
No appreciable disease	8	16	121	37	4	2	32	..	47	267
Not yet diagnosed	..	12	13	..	30	..	1	..	..	56

TABLE J.—CAUSES OF INSANITY AMONGST CASES TREATED IN MENTAL HOSPITALS.

	Punjab.	U. P.	Bihar.	C. P.	Bombay.	Sind.	Madras.	Assam.	Burma.	Total.
Total	160	434	346	171	1,514	94	1,425	137	355	4,636
Mental stress—										
Moral	4	9	6	..	109	1	35	..	..	164
Business worry	10	18	30	4	35	7	113	..	23	240
Domestic worry	2	39	80	3	157	7	225	7	13	533
Stress of military service	..	..	..	..	..	1	1	..	..	2
Toxins—										
Cannabis indica	23	32	11	8	95	19	54	16	11	269
Alcohol	4	3	14	..	39	..	26	..	29	115
Other toxins	1	36	5	..	16	1	15	..	..	74
Opium	1	..	1	..	..	..	5	..	..	7
Physical	..	10	5	4	92	1	27	..	..	139
Bodily illness	1	1	7	..	41	6	54	..	58	168
Pregnancy	..	1	4	2	1	..	3	..	..	11
Child-birth	6	5	..	6	13	..	26	..	4	60
Climacteric	..	4	3	1	5	2	44	..	1	60
Epilepsy	7	17	15	4	42	5	41	8	14	153
Head injury	..	..	..	..	3	..	1	..	..	4
Infections—										
Encephalitis lethargica	1	..	1	..	..	..	..	..	..	2
Influenza	..	..	..	..	..	..	..	..	..	..
Syphilis	..	1	10	..	15	..	78	..	75	179
Other infections	3	..	1	..	2	..	13	2	2	23
Old age	1	27	2	1	26	3	10	..	..	70
Hereditary pre-disposition	8	33	23	27	111	3	158	10	39	412
Previous attacks	28	16	26	14	83	6	142	..	25	340
Unascertained	60	182	102	97	629	32	354	94	61	1,611

TABLE K.—ADMISSIONS BY AGE-GROUPS IN MENTAL HOSPITALS.

	Under 20 years.		20—40 years.		40—60 years.		Over 60 years.		Total.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
British India	139	60	1,625	443	451	162	43	13	2,258	678
Punjab	7	3	97	20	16	2	4	..	124	25
U. P.	28	8	238	57	73	20	7	3	346	88
Bihar	6	6	91	40	27	22	2	4	126	72
C. P.	4	..	48	16	14	1	2	..	68	17
Bombay	55	16	442	143	107	55	14	4	618	218
Sind	2	1	59	2	23	6	1	..	85	9
Madras	27	20	394	106	132	41	10	2	563	169
Assam	5	2	77	21	6	1	..	..	88	24
Burma	5	4	179	38	53	14	3	..	240	56

TABLE L.—ADMISSIONS BY COMMUNITIES IN MENTAL HOSPITALS.

	Hindus.		Muhammadans.		Christians and Europeans.		Others.		Total.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
British India	1,383	385	472	93	173	144	230	56	2,258	678
Punjab	66	17	53	3	2	5	3	..	124	25
U. P.	263	64	74	14	5	10	4	..	346	88
Bihar	69	29	32	11	22	32	3	..	126	72
C. P.	49	13	14	2	5	1	..	1	68	17
Bombay	399	126	122	30	63	45	34	17	618	218
Sind	37	5	44	4	1	..	3	..	85	9
Madras	391	109	103	21	65	37	4	2	563	169
Assam	64	13	15	5	3	4	6	2	88	24
Burma	45	9	15	3	7	10	173	34	240	56

M.—Males. F.—Females.

TABLE M.—EXPENDITURE ON MENTAL HOSPITALS.

	Total.	Diet.	Bedding and clothing.	Medicines.
	Rs.	Rs.	Rs.	Rs.
British India	38,03,677	9,00,276	1,33,653	13,031
Punjab	5,71,460	1,03,530	20,688	1,153
U. P.	2,30,013	65,079	12,750	1,130
Bihar	9,24,106	2,12,463	37,906	6,042
C. P.	1,12,827	33,279	7,238	..
Bombay	7,50,948	1,77,608	36,292	2,527
Sind	72,816	14,171	2,148	136
Madras	5,40,983	1,89,211	8,903	1,475
Assam	1,22,455	44,002	6,356	237
Burma	4,78,069	60,933	1,372	331

Appendix IX

relating to

Section X.

A.—TABLE SHOWING SICKNESS

Statistics by

Provinces.†	Average strength.	Constantly sick.	Influenza. Actuals. A.	Influenza. Actuals. D.	Influenza. Ratios. A.	Influenza. Ratios. D.	Cholera. Actuals. A.	Cholera. Actuals. D.	Cholera. Ratios. A.	Cholera. Ratios. D.
India (excluding Andamans *)	143,118	22	5,645	31	39	0·2	13	4	0·1	...
	143,851	22	3,942	15	27	0·1	18	5	0·1	...
	146,025	*22*	*5,505*	*27*	*38*	*0·2*	*18*	*4*	*0·1*	...
N.-W. F. P.	6,355	24	136	...	21	...	...	...	...	...
	6,557	25	35	...	5	...	...	...	...	...
	6,637	*31*	*97*	*1*	*15*	*0·2*	...	...	...	...
Punjab	19,266	22	155	1	8	0·1	...	...	...	...
	19,939	21	53	1	3	0·1	...	...	...	...
	20,236	*24*	*317*	*4*	*16*	*0·2*	*1*	...	*0·1*	...
U. P.	31,049	21	1,452	15	47	0·5	7	1	0·2	...
	31,659	22	582	...	18	...	13	3	0·4	0·1
	33,156	*21*	*1,142*	*6*	*34*	*0·2*	*9*	*3*	*0·3*	*0·1*
Bihar	10,071	24	702	4	70	0·4	1	1	0·1	0·1
	9,642	22	219	7	22	0·7	...	...	...	...
	10,025	*23*	*366*	*4*	*37*	*0·4*	*2*	*1*	*0·2*	*0·1*
Orissa	930	23	21	...	23	...	...	...	...	...
	943	22	27	...	29	...	...	...	...	...
	924	*22*	*49*	*1*	*53*	*1·1*	...	...	...	...
Bengal	20,437	38	2,078	7	102	0·4	...	...	...	...
	20,249	38	2,297	3	113	0·1	3	1	0·1	...
	17,549	*37*	*1,960*	*5*	*111*	*0·3*	*3*	*1*	*0·2*	...
C. P.	4,665	9	21	...	3	...	...	...	...	...
	4,554	8	33	...	7	...	...	...	...	...
	4,578	*11*	*152*	*1*	*33*	*0·2*	*1*	...	*0·1*	*0·1*
Bombay	7,736	17	110	1	14	0·1	1	...	0·1	...
	7,479	21	39	...	5	...	...	...	...	...
	9,301	*20*	*104*	...	*11*	...	...	...	...	...
Sind	3,543	22	...	...	...	...	...	...	...	...
	3,920	22	1	...	...	...	...	...	...	...
	3,957	*22*	*13*	...	*3*	...	...	...	...	...
Madras	12,728	18	420	3	33	0·2	...	...	...	...
	12,288	16	313	2	25	0·2	...	...	...	...
	12,114	*18*	*555*	*2*	*46*	*0·2*	...	...	...	...
Assam	4,019	23	179	...	45	...	...	...	...	...
	4,015	23	51	2	13	0·5	...	...	...	...
	3,733	*26*	*160*	*2*	*42*	*0·4*	...	...	...	...
Burma	20,267	11	355	...	18	...	4	2	0·2	0·1
	20,116	11	276	...	14	...	2	1	0·1	...
	20,551	*12*	*536*	*1*	*26*	...	*1*	...	...	...

*The sickness and mortality figures relating to Andamans have been dealt with in detail in paragraph 123 of the text of this report.

NOTE.—The three figures against each administrative group are those for (1) 1936, (2) 1935 and (3) 1931-35. The rates have been calculated *per mille* of the average strength.

AND MORTALITY.

Administrations.

Smallpox.				Enteric Fever.				Malaria.			
Actuals.		Ratios.		Actuals.		Ratios.		Actuals.		Ratios.	
A.	D.	A.	D.	A.	D.	A.	D.	A.	D.	A.	D.
72	8	0·5	0·1	270	39	2	0·3	18,704	58	131	0·4
59	3	0·4	...	278	37	2	0·2	19,700	72	137	0·5
57	*3*	*0·4*	...	*315*	*40*	*2*	*0·3*	*22,983*	*77*	*159*	*0·5*
...	...	...	...	38	2	6	0·3	1,012	4	159	0·6
...	...	...	...	33	4	5	0·6	974	3	149	0·5
1	...	*0·2*	...	*30*	*2*	*5*	*0·3*	*1,331*	*3*	*201*	*0·5*
6	1	0·3	0·1	46	7	2	0·4	3,652	8	190	0·4
5	...	0·3	...	85	10	4	0·5	3,839	7	193	0·4
4	...	*0·2*	...	*64*	*8*	*3*	*0·4*	*5,849*	*17*	*289*	*0·8*
13	1	0·4	...	30	...	1	...	5,834	6	188	0·2
41	2	1·3	0·1	24	1	1	...	4,854	12	153	0·4
25	*1*	*0·7*	...	*40*	*6*	*1*	*0·2*	*4,322*	*11*	*149*	*0·3*
4	...	0·4	...	22	6	2	0·6	583	1	58	0·2
...	...	...	...	13	...	1	...	349	8	36	0·8
6	*1*	*0·6*	*0·1*	*31*	*3*	*3*	*0·3*	*796*	*5*	*79*	*0·5*
...	...	...	...	...	...	...	...	87	...	94	...
...	...	...	...	...	...	...	...	49	...	52	...
1	...	*1·5*	...	*1*	...	*1*	*0·4*	*123*	...	*133*	*0·2*
36	3	1·8	0·1	24	3	1	0·1	4,244	20	203	1·0
6	1	0·3	...	25	4	1	0·2	5,119	18	253	0·9
7	*1*	*0·4*	...	*31*	*5*	*2*	*0·3*	*4,787*	*19*	*272*	*1·1*
...	...	...	...	5	1	1	0·2	196	3	42	0·6
2	...	0·4	...	4	...	1	...	216	1	47	0·2
2	...	*0·4*	...	*4*	...	*1*	...	*223*	*3*	*49*	*0·6*
...	...	...	...	20	4	3	0·5	834	3	108	0·4
2	...	0·3	...	11	3	1	0·4	1,592	2	212	0·3
1	...	*0·1*	...	*20*	*2*	*2*	*0·2*	*1,830*	*2*	*197*	*0·2*
1	1	0·3	0·3	26	2	7	0·6	821	2	232	0·6
...	...	...	...	11	2	3	0·5	1,292	2	330	0·5
1	...	*0·4*	...	*13*	*2*	*3*	*0·6*	*1,267*	*2*	*320*	*0·5*
1	...	0·1	...	29	6	2	0·5	307	2	24	0·2
1	...	0·1	...	19	4	2	0·3	222	3	18	0·2
2	...	*0·1*	...	*23*	*2*	*2*	*0·2*	*237*	*2*	*20*	*0·1*
2	...	0·5	...	8	1	2	0·2	318	2	79	0·5
...	...	...	...	10	3	2	0·7	564	5	140	1·2
...	...	*0·1*	...	*7*	*1*	*2*	*0·3*	*501*	*3*	*132*	*0·7*
8	2	0·4	0·1	20	6	1	0·3	302	3	15	0·1
1	...	...	...	35	...	2	0·3	301	5	15	0·2
6	*1*	*0·3*	...	*41*	...	*2*	*0·3*	*445*	*8*	*22*	*0·4*

A.—Admissions. D.—Deaths.
† Excluding subsidiary jails.

A.—TABLE SHOWING SICKNESS

Statistics by

Provinces.†	Average strength.	Constantly sick.	Pyrexia of uncertain origin. Actuals. A.	Actuals. D.	Ratios. A.	Ratios. D.	Tubercle of the Lungs. Actuals. A.	Actuals. D.	Ratios. A.	Ratios. D.
India (excluding Andamans*)	143,118	22	853	5	6	...	898	279	6	1·9
	143,851	22	1,000	10	7	0·1	789	310	5	2·2
	145,025	*22*	*1,447*	*7*	*10*	*0·1*	*851*	*278*	*6*	*1·9*
N.-W. F. P.	6,355	24	23	...	4	...	51	19	8	3·0
	6,557	25	23	1	4	0·2	56	24	9	3·8
	6,637	*31*	*24*	...	*4*	...	*61*	*20*	*9*	*3·0*
Punjab	19,266	22	314	4	16	0·2	205	53	11	2·8
	19,939	21	224	2	11	0·1	186	71	9	3·6
	20,236	*24*	*294*	*2*	*15*	*0·1*	*142*	*54*	*7*	*2·7*
U. P.	31,049	21	140	...	5	...	97	28	3	0·9
	31,659	22	417	...	13	...	92	35	3	1·1
	33,156	*21*	*361*	*1*	*11*	...	*163*	*39*	*5*	*1·2*
Bihar	10,071	24	4	...	...	...	66	35	7	3·5
	9,642	22	8	...	1	...	75	44	8	4·6
	10,025	*28*	*24*	...	*2*	...	*77*	*35*	*8*	*3·5*
Orissa	930	23	1	...	1	...	5	2	5	2·2
	943	22	1	...	1	...	3	1	3	1·1
	924	*22*	*3*	...	*3*	*0·2*	*4*	*2*	*5*	*1·9*
Bengal	20,437	38	193	...	9	...	125	46	6	2·3
	20,249	38	136	2	7	0·1	115	27	6	1·3
	17,549	*37*	*387*	*1*	*22*	...	*95*	*27*	*5*	*1·6*
C. P.	4,665	9	26	1	6	0·2	21	7	5	1·5
	4,554	8	26	2	6	0·4	14	7	3	1·5
	4,578	*11*	*89*	*1*	*20*	*0·2*	*31*	*7*	*7*	*1·4*
Bombay	7,736	17	19	...	3	...	31	16	4	2·1
	7,479	21	1	...	...	...	37	19	5	2·5
	9,301	*20*	*7*	...	*1*	...	*29*	*11*	*3*	*1·2*
Sind	3,543	22	...	...	...	...	16	6	5	1·7
	3,920	22	5	...	1	...	11	3	3	0·8
	3,957	*22*	*3*	...	*1*	...	*12*	*5*	*3*	*1·4*
Madras	12,728	18	23	...	2	...	115	12	9	0·9
	12,288	16	10	...	1	...	59	15	5	1·2
	12,114	*18*	*27*	...	*2*	...	*87*	*19*	*7*	*1·6*
Assam	4,019	23	11	...	3	...	55	14	14	3·5
	4,015	23	9	...	2	...	39	11	10	2·7
	3,733	*26*	*13*	...	*4*	*0·1*	*34*	*11*	*9*	*2·8*
Burma	20,267	11	96	...	5	...	99	38	5	1·9
	20,116	11	127	1	6	...	94	48	5	2·4
	20,551	*12*	*204*	*1*	*10*	...	*98*	*46*	*5*	*2·2*

*The sickness and mortality figures relating to Andamans have been dealt with in detail in paragraph 123 of the text of this report.

†Excluding subsidiary jails. A.—Admissions. D.—Deaths.

AND MORTALITY—*contd.*

Administrations.

Pneumonia.				Other respiratory diseases.				Dysentery.			
Actuals.		Ratios.		Actuals.		Ratios.		Actuals.		Ratios.	
A.	D.	A.	D.	A.	D.	A.	D.	A.	D.	A.	D.
1,460	301	10	2·1	3,603	56	25	0·4	4,376	110	31	0·8
1,432	293	10	2·0	3,599	46	25	0·3	4,249	100	30	0·7
1,644	*362*	*11*	*2·6*	*4,316*	*59*	*30*	*0·4*	*5,422*	*115*	*37*	*0·8*
92	14	15	2·2	235	...	37	...	16	1	3	0·2
106	18	16	2·7	206	1	31	0·2	45	...	7	...
190	*31*	*29*	*4·7*	*405*	*3*	*61*	*0·4*	*86*	*1*	*13*	*0·2*
160	38	8	2·0	729	3	38	0·2	141	2	7	0·1
159	26	8	1·3	633	2	32	0·1	246	11	12	0·6
231	*62*	*11*	*3·0*	*898*	*7*	*44*	*0·4*	*607*	*11*	*30*	*0·5*
320	74	10	2·4	753	15	24	0·5	401	8	13	0·3
263	64	8	2·0	791	18	25	0·6	360	5	11	0·2
335	*77*	*10*	*2·3*	*836*	*13*	*25*	*0·4*	*630*	*12*	*19*	*0·4*
85	20	8	2·0	275	3	27	0·3	676	19	67	1·9
133	20	14	2·1	332	5	34	0·5	489	8	51	0·8
155	*30*	*16*	*3·0*	*395*	*6*	*39*	*0·6*	*731*	*15*	*73*	*1·5*
10	1	11	1·1	22	...	24	...	41	...	44	...
8	2	9	2·1	15	...	16	...	28	2	30	2·1
11	*3*	*12*	*3·0*	*20*	...	*22*	*0·2*	*33*	*2*	*35*	*1·9*
253	51	12	2·5	760	9	37	0·4	1,498	37	73	1·8
269	55	13	2·7	827	7	41	0·3	1,318	21	65	1·0
218	*45*	*12*	*2·5*	*660*	*9*	*38*	*0·5*	*1,143*	*22*	*65*	*1·2*
54	13	12	2·8	41	6	9	1·3	148	10	32	2·1
33	10	7	2·2	38	1	8	0·2	167	3	37	0·7
39	*11*	*9*	*2·3*	*68*	*4*	*15*	*0·9*	*172*	*5*	*38*	*1·2*
45	4	6	0·5	151	3	20	0·4	137	3	18	0·4
47	8	6	1·1	134	...	18	...	115	2	15	0·3
59	*10*	*6*	*1·1*	*225*	*2*	*24*	*0·3*	*404*	*3*	*43*	*0·3*
126	18	36	5·1	139	1	39	0·3	291	4	82	1·1
97	14	25	3·6	172	1	44	0·3	322	8	82	2·0
132	*25*	*34*	*6·3*	*210*	*2*	*53*	*0·4*	*244*	*2*	*62*	*0·6*
83	17	7	1·3	141	5	11	0·4	433	13	34	1·0
85	13	7	1·1	102	7	8	0·6	505	9	41	0·4
56	*13*	*5*	*1·1*	*154*	*6*	*13*	*0·5*	*546*	*11*	*45*	*0·9*
67	10	17	2·5	155	1	39	0·2	361	7	90	1·7
103	23	26	5·7	162	1	40	0·2	386	15	96	3·7
62	*16*	*16*	*4·3*	*200*	*2*	*53*	*0·4*	*437*	*12*	*115*	*3·1*
123	30	6	1·5	156	9	8	0·4	125	6	6	0·3
98	31	5	1·5	110	2	5	0·1	161	16	8	0·8
127	*33*	*6*	*1·6*	*151*	*4*	*7*	*0·2*	*307*	*18*	*15*	*0·9*

NOTE.—The three figures against each administrative group are those for (1) 1936, (2) 1935 and (3) 1931-35. The rates have been calculated *per mille* of the average strength.

A.—TABLE SHOWING SICKNESS

"

Statistics by

Provinces.†	Average strength.	Constantly sick.	Diarrhœa. Actuals. A.	Actuals. D.	Ratios. A.	Ratios. D.
India (excluding Andamans*)	143,118	22	2,218	24	15	0·2
	145,851	22	2,897	14	20	0·1
	145,025	*22*	*3,000*	*27*	*21*	*0·2*
N.-W. F. P.	6,355	24	23	2	4	0·3
	6,557	25	26	1	4	0·2
	6,637	*31*	*49*	*1*	*7*	*0·1*
Punjab	19,266	22	223	4	12	0·2
	19,939	21	231	4	14	0·2
	20,236	*24*	*377*	*8*	*19*	*0·4*
U. P.	31,049	21	283	8	9	0·3
	31,659	22	419	2	13	0·1
	33,156	*21*	*443*	*6*	*13*	*0·2*
Bihar	10,071	24	127	1	13	0·1
	9,642	22	136	...	14	...
	10,025	*28*	*359*	*1*	*36*	*0·1*
Orissa	930	23	45	...	48	...
	943	22	32	...	34	...
	924	*22*	*25*	...	*27*	...
Bengal	20,437	38	1,056	2	52	0·1
	20,249	38	1,497	...	74	...
	17,549	*37*	*1,092*	*2*	*62*	*0·1*
C. P.	4,665	9	80	2	17	0·4
	4,554	8	112	...	25	...
	4,578	*11*	*81*	*2*	*18*	*0·5*
Bombay	7,736	17	160	1	21	0·1
	7,479	21	168	...	23	...
	9,301	*20*	*291*	*1*	*31*	*0·1*
Sind	3,543	22	106	1	30	0·3
	3,920	22	99	2	21	0·5
	3,957	*22*	*92*	*1*	*23*	*0·4*
Madras	12,728	18	30	1	2	0·1
	12,288	16	31	1	3	0·1
	12,114	*18*	*24*	*2*	*2*	*0·2*
Assam	4,019	23	11	...	3	...
	4,015	23	61	2	15	0·5
	3,733	*26*	*78*	*1*	*21*	*0·2*
Burma.	20,267	11	35	...	2	...
	20,116	11	55	2	*3*	0·1
	20,551	*12*	*50*	*2*	*3*	*0·1*

*The sickness and mortality figures relating to Andamans have been dealt with in detail in paragraph 123 of the text of this report.

† Excluding subsidiary jails. A.—Admissions. D.—Deaths.

AND MORTALITY—*concld.*

Administrations.

Anæmia and Debility.				All Causes.			
Actuals.		Ratios.		Actuals.		Ratios.	
A.	D.	A.	D.	A.	D.	A.	D.
1,045	43	7	0·3	69,191	1,556	483	11
1,060	43	7	0·3	71,479	1,596	497	11
1,187	*43*	*8*	*0·3*	*81,804*	*1,681*	*564*	*12*
22	...	4	...	3,329	55	524	9
37	1	6	0·2	2,704	69	412	11
43	...	*7*	...	*3,732*	*82*	*562*	*12*
137	3	7	0·2	11,060	199	574	10
105	2	5	0·1	11,508	208	582	10
199	*4*	*10*	*0·2*	*15,442*	*271*	*763*	*13*
172	3	6	0·1	15,967	255	514	8
154	4	5	0·1	15,430	240	487	8
191	*6*	*6*	*0·2*	*16,612*	*281*	*501*	*9*
17	2	2	0·2	3,696	155	367	15
17	2	2	0·2	3,225	175	335	18
19	*1*	*2*	*0·1*	*4,848*	*169*	*484*	*17*
6	1	7	1·1	478	9	514	10
7	...	7	...	328	15	348	16
6	...	*6*	*0·4*	*441*	*14*	*477*	*16*
353	4	17	0·2	19,149	263	937	13
367	10	18	0·5	21,173	222	1,046	11
344	*10*	*20*	*0·6*	*18,631*	*219*	*1,059*	*13*
24	1	5	0·2	1,080	87	232	19
31	1	7	0·2	1,021	46	224	10
22	*3*	*5*	*0·7*	*1,361*	*55*	*297*	*12*
69	1	9	0·1	3,021	76	391	10
17	2	10	0·3	4,044	77	541	10
83	*3*	*9*	*0·4*	*5,430*	*67*	*534*	*7*
7	1	2	0·3	2,348	48	663	14
24	2	6	0·5	2,910	58	743	15
23	*1*	*6*	*0·4*	*2,753*	*73*	*696*	*19*
114	8	9	0·6	3,212	132	252	10
99	2	6	0·2	2,915	141	237	12
93	*3*	*8*	*0·3*	*3,506*	*124*	*290*	*10*
37	6	9	1·5	1,686	57	420	14
102	10	25	2·5	1,992	87	496	22
64	*6*	*17*	*1·5*	*2,144*	*69*	*565*	*18*
68	12	3	0·6	2,887	188	142	9
54	6	3	0·3	2,932	219	146	11
70	*9*	*3*	*0·4*	*5,253*	*227*	*256*	*11*

NOTE.—The three figures against each administrative group are those for (1 1936, (2) 1935 and (3) 1931-35. The rates have been calculated *per mille* of the average strength.

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ANNUAL REPORT

OF THE

PUBLIC HEALTH COMMISSIONER WITH THE GOVERNMENT OF INDIA

FOR 1936

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OF THE
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VOLUME II.

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Average strength, admissions into hospital, deaths, numbers invalided and constantly sick.

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ABBREVIATIONS.

A.	Admissions.
A. D. H.	Assistant Director of Hygiene.
A. D. P.	Assistant Director of Pathology.
Av. c. s.	Average constantly sick.
A. H. Q.	Army Head Quarters.
B. M. H.	British Military Hospital.
B. Os.	British Officers.
B. O. Rs.	British Other Ranks.
C.	Cases.
C. M. %	Case mortality per cent.
D.	Deaths.
D. A. D. P.	Deputy Assistant Director of Pathology.
D. A. H.	Disordered Action of the Heart.
G. S. W.	Gun-shot Wounds.
I. O. Rs.	Indian Other Ranks.
M. Os.	Medical Officers.
N. C. Os.	Non-Commissioned Officers.
O. C.	Officer Commanding.
P.	Primary.
P. A.	Per annum.
P. M.	Per mille.
P. U. O.	Pyrexia of uncertain origin.
R.	Revaccinations.
U. K.	United Kingdom.
V. D.	Venereal diseases.
V. D. H.	Valvular diseases of the heart.
%	Per cent.

ANNUAL REPORT OF THE PUBLIC HEALTH COMMISSIONER WITH THE GOVERNMENT OF INDIA FOR 1936.

VOLUME II.

SECTION I.

ON THE HEALTH OF THE BRITISH ARMY IN INDIA.

(From the Director of Medical Services in India.)

1. General health statistics of the British Army in India during the year 1936 are given in the table below :—

TABLE 1.

1936.	Average strength.	Admissions. No.	Admissions. Ratio per 1,000.	Deaths. No.	Deaths. Ratio per 1,000.	Invalids sent home. No.	Invalids sent home. Ratio per 1,000.	Invalids discharged from service. No.	Invalids discharged from service. Ratio per 1,000.	Average constantly sick. No.	Average constantly sick. Ratio per 1,000
Officers	2,269	973	428·8	14	6·17	52	22·92	...	...	31·54	13·90
Other Ranks	52,059	30,301	582·1	129	2·48	572	10·99	...	...	1,399·21	26·88
Numbers of Nursing Service.	...	86	...	1	...	5	...	...	...	3·61	...
Women	4,055	1,369	337·6	13	3·21	44	10·85	...	...	46·54	11·48
Women confinement	...	779	...	1	...	...	...	...	...	29·99	...
Children	6,192	2,077	335·4	83	13·40	20	3·23	...	...	64·18	10·36
Royal Navy	...	40	...	2	...	...	...	...	...	2·30	...
Royal Air Force	2,065	964*	466·8	9	4·36	45	21·79	...	...	43·75*	21·18
R. A. F. Women and Children.	...	61	...	2	...	...	...	...	...	1·80	...
R. A. F. Women confinement.	...	19	...	...	...	...	...	...	...	0·72	...
Royal Indian Marine	...	1	...	...	...	...	...	...	...	0·05	..
Boys of L. R. M. School Sanawar.	...	436	...	...	...	...	...	...	...	17·69	...
Others :											
Men	...	377	...	22	...	...	...	...	...	13·35	...
Women	...	354	...	4	...	15	...	...	...	9·82	...
Women confinement.	...	101	...	1	...	...	...	...	...	3·81	...
Children	...	184	...	5	...	3	...	...	...	3·96	...

* Includes 350 and 12·51 respectively for R. A. F. cases treated in quarters.

The ratios per 1,000 for admissions, deaths and invalids, amongst officers and other ranks for the quinquennial periods 1910-14, 1920-24, 1925-29 and 1930-34 with those for 1935 and 1936 are given separately for purposes of comparison in the following table :—

TABLE 2.

Periods.	Ratio per 1,000. Admissions. Officers.	Admissions. Other Ranks.	Deaths. Officers.	Deaths. Other Ranks.	Invalids. Officers.	Invalids. Other Ranks.
1910—14	567·5	567·2	5·14	4·36	16·30	7·03
1920—24	676·7	791·9	6·71	5·24	20·99	18·91
1925—29	589·9	619·4	5·25	2·90	17·44	13·50
1930—34	428·6	604·7	6·69	2·64	20·09	8·88
1935	470·1	567·1	6·74	2·55	24·25	6·90
1936	**428·8**	**582·1**	**6·17**	**2·48**	**22·92**	**10·99**

Officers.

2. 428·8 per 1,000 of strength were admitted to hospital during the year, compared with 470·1 in 1935.

The principal causes of sickness were :—

Dysentery	92	Fractures	34
Malaria	71	Contusions	22
Sandfly fever	64	Gastritis	22
Diarrhœa	60	Sprain and strain	20
Jaundice	55	Appendicitis	20
Cellulitis	55	Concussions	19
Tonsillitis	43	Dengue	16

There were 14 deaths giving a ratio of 6·17 per 1,000 compared with 16 and 6·74 per 1,000 in 1935.

The causes of deaths were injuries (other than G. S. W.) 8 cases, G. S. wound, 3 and Extra dural middle meningeal hæmorrhage, Intrathoracic tumour, Retroperitonial cyst each one case.

The average constantly sick in hospital was 31·54 or 13·90 per 1,000 of strength as compared with 37·61 or 16·89 in the previous year.

A total of 1,229 or 541·6 per 1,000 of the strength were treated as out patients.

Soldiers.

3. There were 30,301 admissions to hospital, giving a ratio per 1,000 of 582·1 as compared with 567·1 in 1935 and 580·5 in 1913.

The principal causes of admission to hospital showing the increase or decrease compared with the previous year were :—

	1936.	Increase or decrease.		1936.	Increase or decrease.
Malaria	3,017	+ 62	Boils	473	..
Cellulitis	2,297	— 4	Pharyngitis	462	+ 42
Sandfly fever	1,758	— 164	Impetigo contagiosa	390	+ 19
Tonsillitis	1,516	+ 22			
Gonorrhœa	1,340	— 17	Appendicitis	385	— 38
Dysentery	1,283	— 253	Gastritis	357	+ 50
			Constipation	339	+ 7
Sprain	866	— 41			
Diarrhœa	859	+ 125			
Bronchitis	834	+ 77	Coryza	318	+100
			Jaundice	279	— 74
Fractures	761	+ 51	Wounds	277	— 26
Contusion	687	+ 80			
Influenza	646	+ 86			
			Dengue	244	— 18
Common cold	580	+ 238	Soft chancre	241	—116
Synovitis	520	— 58	Syphilis	214	—101
Tinea	498	+ 205			

8 Diphtheria "Carriers" were admitted to hospital.

There were 129 deaths or 2·48 per 1,000 of the strength compared with 134 or 2·55 per 1,000 in 1935.

The most important causes of mortality were :—

Local injuries (including 18 Gun shot wounds)	31
Pneumonia	21
General injuries	19
Infectious diseases	18
Digestive diseases	17
Circulatory diseases	14

There were 572 or 10·99 per 1,000 of the strength sent home as invalids compared with 363 or 6·90 per 1,000 in 1935.

The principal causes of invaliding to the United Kingdom were :—

	1936.	Increase or Decrease.		1936.	Increase or Decrease.
Mental diseases, other than schizophrenia.	67	+34	Epilepsy	17	+ 4
			Deafness	16	+15
Pulmonary tuberculosis	63	+28	Diseases of bronchi and bronchioles	15	+ 5
Diseases of joints	39	+18	Valvular disease of the heart	13	+ 3
Injuries, other than fractures	32	+11	Deformities of limbs	12	— 1
Schizophrenia	31	+11	Diseases of the urinary organs	12	— 5
Fractures	27	+18	Tuberculosis, other than pulmonary	9	..

The average number constantly sick in hospital was 1,399·21 or 26·88 per 1,000 of the strength, compared with 1,407·76 or 26·74 per 1,000 in 1935.

The diseases chiefly responsible were :—

	Average constantly sick.		Average constantly sick.
Gonorrhœa	172·51	Appendicitis	25·80
Malaria	112·13	Sprain and strain	25·79
Cellulitis	81·85	Soft chancre	25·64
Dysentery	59·08	Synovitis	21·87
Fractures	57·53	Contusions	21·71
Tonsillitis	37·80	Diarrhœa	20·01
Sandfly fever	34·57	Syphilis	19·56
Bronchitis	29·57		

A total of 83,746 men, or 1,608·7 per 1,000 of the strength were treated as out-patients. The average daily number under treatment was 1,208·82 or 23·22 per 1,000.

The combined ratio of constantly sick in hospital and under treatment as out-patients was 50·10 per 1,000 of the strength, compared with 47·42 in 1935.

The actual loss to the Army in India in working days was 512,111 due to sick in hospital and 442,428 due to sick in barracks, making a total of 954,539 days compared with 911,229 in 1935.

The admission and death ratios per 1,000 of the strength for all causes and certain important diseases for stations with a strength of 1,000 and upwards compared with all India, are shown in the following tables :—

TABLE 3.

Table showing total admissions and deaths ratios per 1,000 of the strength for all causes and certain important diseases for stations with a strength of 1,000 and upwards compared with all-India.

		Stations with total admission ratios higher than all-India.					
		Peshawar.	Meerut.	Nowshera.	Lahore.	Sialkot.	All-India.
Strength.		1,273	1,709	1,162	1,112	1,259	52,059
All Causes.	A.	923·0	737·3	728·1	634·0	584·6	582·1
	D.	6·28	1·76	2·58	4·50	2·38	2·48
	Av. C. S.	40·29	43·56	25·28	35·19	23·08	26·88
Malaria	A.	146·9	62·0	96·4	31·5	6·4	58·0
	D.	...	...	...	...	...	0·06
Sandfly fever	A.	298·5	2·3	194·5	26·1	30·2	33·8
	D.	...	...	...	...	...	...
Enteric group of fevers	A.	2·4	1·8	...	1·8	3·2	1·5
	D.	...	...	...	...	0·79	0·06
Dysentery	A.	35·3	45·1	7·7	17·1	15·1	24·6
	D.	...	...	...	...	...	...
Diarrhœa	A.	16·5	31·6	21·5	15·3	38·1	16·5
	D.	...	...	...	...	...	...
Influenza	A.	1·6	15·2	4·3	13·5	6·4	12·4
	D	...	...	...	...	...	...
Pneumonia (Lobar and Lobular)	A.	7·9	4·7	6·9	6·3	2·4	3·5
	D.	2·36	0·59	0·86	0·90	...	0·38
Venereal diseases	A.	42·4	39·2	22·4	62·1	27·8	34·5
	D.	...	...	...	...	...	...
Minor septic diseases	A.	60·5	49·2	69·7	48·6	57·2	59·5
	D.	...	...	...	...	...	0·02
Local injuries	A.	53·4	70·8	73 1	58·5	81·8	61·8
	D.	...	1·17	0·86	...	...	0·59
Heat-stroke	A.	...	...	...	1·8	2·4	0·2
	D.	...	...	...	...	...	0·06
Heat exhaustion.	A.	...	0·6	...	2·7	2·4	0·7
	D.	...	...	...	...	0·79	0·02

A.—Admissions.
D.—Deaths.
Av. C. S.—Average constantly sick.

TABLE 3—*contd.*

Table showing total admissions and deaths ratios per 1,000 of the strength for all causes and certain important diseases for stations with a strength of 1,000 and upwards compared with all-India.

		Stations with total admission ratios lower than all-India.										
		Poona.	Razmak.	Jhansi.	Rawal-pindi.	Jubbul-pore.	Luck-now.	Mhow.	Secunde-rabad.	Banga-lore.	Rani-khet.	All-India.
Strength.		2,377	1,062	1,108	2,441	1,399	2,216	1,479	2,594	1,047	1,177	52,059
All Causes	A.	565·8	555·6	537·9	527·7	526·1	523·0	513·9	485·0	484·2	449·4	582·1
	D.	4·63	2·82	1·81	4·10	2·14	2·26	0·68	0·77	2·87	0·85	2·48
	Av. c. s.	39·65	26·85	21·24	21·93	24·30	26·80	27·41	21·77	27·25	30·18	26·88
Malaria	A.	76·6	43·3	67·7	103·2	61·5	20·8	81·1	3·1	10·5	18·7	58·0
	D.	...	...	...	...	0·71	...	...	...	...	...	0·06
Sandfly fever	A.	...	...	18·1	34·8	2·1	28·4	...	39·3	3·8	...	33·8
	D.	...	...	...	...	...	...	...	...	...	...	...
Enteric group of fevers	A.	1·7	...	1·8	1·2	...	0·9	1·4	...	...	...	1·5
	D.	...	...	0·90	...	...	...	...	...	...	...	0·06
Dysentery	A.	36·2	17·9	20·8	15·6	28·6	24·8	17·6	22·7	28·7	51·8	24·6
	D.	...	...	...	5·3	18·6	30·2	18·3	13·5	1·0	17·0	16·5
Diarrhœa	A.	12·2	15·1	22·6	27·4	...	7·2	5·4	...	...	37·4	12·4
	D.	...	...	1·8	...	...	...	...	...	...	...	...
Influenza	A.	3·8	13·2	...	...	...	...	...	...	...	...	...
	D.	...	...	...	...	...	...	...	...	...	...	...
Pneumonia (Lobar and Lobular).	A.	0·8	5·6	4·5	6·1	4·3	4·1	4·7	1·5	...	4·2	3·5
	D.	0·42	...	...	0·82	...	0·90	...	...	...	...	0·38
Venereal diseases	A.	32·4	1·9	12·6	29·1	49·3	38·4	13·5	18·9	70·7	5·1	34·5
	D.	...	...	...	...	...	...	...	...	...	...	...
Minor septic diseases	A.	48·8	88·5	77·6	53·3	39·3	44·2	49·4	44·3	64·0	29·7	59·5
	D.	...	...	...	0·41	...	...	...	...	...	...	0·02
Local injuries	A.	45·0	41·4	50·5	45·5	72·2	48·7	61·5	65·5	61·1	45·9	61·8
	D.	0·84	0·94	...	2·05	...	0·45	...	0·39	0·96	...	0·59
Heat-stroke	A.	...	...	...	0·4	...	...	...	...	...	...	0·2
	D.	...	...	...	0·41	...	...	...	...	...	...	0·06
Heat exhaustion.	A.	...	...	0·9	0·4	0·7	...	...	...	...	...	0·7
	D.	...	...	0·90	...	0·71	...	...	...	...	...	0·02

A.—Admissions.
D.—Deaths.
Av. C. S.—Average constantly sick.

PRINCIPAL DISEASES AFFECTING THE BRITISH ARMY.

Malaria.

TABLE 4.

4. Ratio per 1,000 admissions for malaria among British troops by Commands 1932—36.

	1932.	1933.	1934.	1935.	1936.
Northern Command . .	91·7	159·8	75·8	57·3	78·5
Eastern Command . . .	89·5	62·6	48·1	44·8	36·8
Southern Command . .	62·4	60·6	55·3	48·9	45·3
Western Command . . .	131·1	204·0	160·4	136·1	103·9
Burma District . . .	46·3	39·8	54·9	29·2	70·7
All India	84·1	103·3	67·5	56·1	58·0

It was predicted that 1936 would be a bad year for malaria in India, but, in so far at any rate as the Army was concerned, expectations were not fulfilled and except for Northern Command and Burma District there was a general decrease.

Climatic conditions were favourable for malaria. The monsoon arrived early in North Eastern India and there was an excess of rainfall in Eastern Command with some heavy floods in the Gangetic plain. There were no pronounced breaks in the monsoon and during October to December, when the South West monsoon should have been retreating, rainfall was generally in excess in the plains as a whole. In Western Command rainfall was in defect throughout the year.

The increase of malaria in Northern Command was an aftermath of the Mohmand Operations of 1935. During these operations "delay action" quinine was given to the men in camps which were notoriously malarious. While this had the effect of keeping men at duty it reacted later by producing an increased number of relapse cases and latent fresh infections during the following spring. In addition in the Rawalpindi District the breeding season extended into late November with many admissions during that month.

The stations with strengths of over 500 in which the malaria admissions exceeded 100 per 1,000 were :—

Multan	176·0
Hyderabad	163·5
Peshawar	146·9
Quetta.	113·2
Landikotal	104·5

The reason for Multan being now the most malarious military station is considered to be due to the change in climatic conditions, with increased humidity and rainfall, which has become apparent in the areas affected by new irrigation from the river Indus. Increased malaria in Hyderabad is attributable to the same cause. The results already noted caused by "delay action" quinine in the Mohmand Operations account for the increased incidence in Peshawar and Landikotal.

Malaria in Delhi has been still further reduced from 87·5 per 1,000 in 1935 to 71·6 per 1,000 in 1936. This is due, at any rate in part, to intensive anti-malaria measures for both civil and military areas in the city.

TABLE 5.

Varieties of Malaria among British Troops.

	B. T.	M. T.	Quartan.	Mixed.	Clinical.	Total.
Northern Command	1,087	172	3	11	51	1,324
Eastern Command .	440	99	2	8	28	577
Southern Command.	409	178	32	17	23	659
Western Command .	297	23	1	7	5	333
Burma District .	73	32	1	2	16	124
All India . .	2,306	504	39	45	123	3,017

It will be seen from the above table that the three varieties of malaria parasites are common in Southern Command, this being the only Command in which quartan malaria occurs to any extent. The proportion of cases diagnosed clinically remains much the same as in 1935.

Routine treatment has been by (1) atebrin 0·3 grammes daily for seven days followed after an interval of three days by plasmoquine 0·03 grammes daily for five days. In some hospitals quinine is given for the first 48 hours after admission, and prior to the administration of atebrin, or (2) quinine 20 grains with plasmoquine 0·03 grammes daily for 21 days.

The relapse rate for all India still remains at almost half that prevailing in 1932, *e.g.*, 18·7 per 1,000 as compared with 34·9 per 1,000 in 1932. In Southern Command the ratio has decreased each year since 1932 (22·0 per 1,000) to 9·0 per 1,000. Similar figures are obtained from Eastern Command, where in 1932 the relapse rate was 31·9 per 1,000, and in 1936 it is 6·3 per 1,000. Northern Command and Western Command show high increases in the relapse rate over 1935, *e.g.*, 32·8 per 1,000 as compared with 13·2 per 1,000 in 1935 in Northern, and 47·1 per 1,000 in Western Command compared with 24·8 per 1,000 in 1935. The figures in Northern Command are understandable as being probably the aftermath of the Mohmand Operations, when "delay action" quinine was used in the later stages of operations, and treatment of such cases as occurred would be unavoidably spasmodic and interrupted owing to the necessity for evacuation down over 200 miles of L. of C. from the forward areas. Western Command figures are not understood. Owing to the fact that two treatments are in vogue, at the discretion of medical officers, (*a*) atebrin-plasmoquine, (*b*) quinine and plasmoquine, it is impossible without investigating thousands of treatment cards to assign a larger proportion of relapses to either form of treatment. It has been suggested that only one form of treatment should be authorised for a period of a year, but administrative medical authority is unwilling quite naturally to interfere with the personal opinions of medical officers carrying out treatment.

An experiment was carried out in Agra by lowering the fringes of electrically propelled *punkhas* so that there was a clearance of only 18 inches above the heads of men lying in bed. By this means the use of mosquito nets was avoided and there was more movement of air. There was no increased incidence of malaria on account of the absence of mosquito nets and the men enjoyed increased comfort during the hot weather but during the latter part of the rainy season the lowered fringes caused too cold a draught of air.

Trials were made to find a culicifuge with a less fleeting action than P. C. oil and one which can more easily be carried by the troops. A semi-solid substance known as Dover's Cream consisting of oil of citronella half ounce, spirits of camphor ¼ ounce, oil of cedar wood ¼ ounce and white petroleum

jelly 2 ounces gave promise of good results and screw cap aluminium containers for this preparation are to be issued to troops in Northern Command for trial.

Experiments have been made with Malarial as a substitute for the usual army antilarval mixture of crude oil and kerosene. The experiments have not been conclusive and will be extended next year.

Dengue and Sandfly Fever.

5. *Incidence of Dengue and Sandfly Fever among British troops from 1932 to 1936.*

TABLE 6.

		1932.	1933.	1934.	1935.	1936.
Dengue	Admissions	432	644	360	262	244
	Ratio per 1,000	7·8	11·7	6·6	5·0	4·7
Sandfly fever.	Admissions	2,262	2,252	1,973	1,922	1,758
	Ratio per 1,000	40·9	40·9	36·2	36·5	33·8

Dengue.—The incidence of this disease shows a still further decrease this year, there having been 244 cases compared with 262 in 1935.

The stations with the highest incidence were :—

	Actual.	Ratio per 1,000.
Madras	46	60·4
Secunderabad	40	15·4
Calcutta	36	38·2
Benares	27	190·1
Mingaladon	21	23·5
Karachi	18	14·6

There was an increase of sandfly fever at Secunderabad during the year and the possibility of confusion of diagnosis may account for the simultaneous increase of dengue in that station although it is significant that the dengue cases occurred when Aedes mosquitoes were prevalent and Phlebotomus, although present, were few in number in the station.

The complete absence of dengue among troops in Karachi last year has not been sustained. Although there were 18 cases among British troops in the station, there was however only one case among Indian troops.

Sandfly fever.—From Table 6 it will be seen that there has been a reduction in the incidence of this disease but it still ranks third in the causes of sickness among British troops in India being, with the exception of minor septic diseases, next in importance to malaria.

Northern Command bears the greater part of the brunt of this disease as in former years, Landikotal and Peshawar being the stations particularly affected. Efforts to prevent sandfly fever are at present necessarily confined to measures such as whitewashing, spraying and repairs to building until such time as the more effective measure of replacing all old buildings can be carried out. Systematic and thorough spraying of rooms with a solution of pyrethrum extract and kerosene oil has proved effective against sandflies as well as mosquitoes.

Pyrexia of Uncertain Origin.

6. There has been a steady decrease of these cases in the last five years. Four of the cases which occurred in Northern Command, where sandfly fever is prevalent, and two cases in Kamptee might equally well have been

diagnosed sandfly fever. One other case, occurring in Northern Command, was originally diagnosed as Rheumatism.

The following figures illustrate the decrease in the use of the term P. U. O. :—

1932	106
1933	61
1934	46
1935	37
1936	10

Oriental Sore.

7. At the end of 1935, the number of cases of oriental sore in Quetta, where the disease is endemic, were found to be increasing and early in 1936 the disease began to assume epidemic proportions among the local population in city and cantonment. In April 1936, Dr. Smith, Director of the Pasteur Institute, Kasauli, was sent to Quetta under the orders of the Government of India to carry out an investigation and to advise on measures for prevention. Two men from each large and one from each small military unit in Quetta were detailed to work under Dr. Smith and the resources of the District Laboratory were placed at his disposal.

Although conditions prevailing after the earthquake in May 1935 might be considered favourable for increased breeding of sandflies in the piles of debris, no such evidence was forthcoming and the irregularity of infection among units in relation to proximity to the ruined city did not suggest infection from sandflies breeding in the ruins. The chief predisposing factor was probably that during July, August and September 1935, when infection probably occurred, the majority of the population were living under abnormal conditions and the risk of infection was greater.

Over 600 cases of all classes were treated by the medical specialist at Quetta. Included in this number were 34 cases among British troops in Quetta. In addition there were 26 cases in a battalion of British troops in Secunderabad which had left Quetta at the end of 1935.

Treatment found eventually to give the best results consisted of curettage under gas followed by application of pure carbolic acid, the wound then being covered with elastoplast and left for two weeks. A modification of the above was used latterly in the Indian Military Hospital. After curettage, tannic acid was dusted on the wound to minimise bleeding and, for the sake of economy, sterile vaseline was used instead of elastoplast with equally successful results.

In very extensive cases, especially those with multiple sores on the face sodium antimony tartrate was given intravenously starting with $\frac{1}{4}$ grain and increasing on alternate days by $\frac{1}{4}$ to $1\frac{3}{4}$ grains up to 10 to 15 grains. Trivalent antimony compounds were found to be more effective than the pentavalent.

Another method of treatment which was commented on favourably by the Surgical Specialist, Lahore District, was to clean the sore with a hydrogen peroxide dressing for two days and then dress it daily with a special copper sulphate and lactic acid solution. This solution is made by dissolving 120 grains of copper sulphate in 2 lbs. of distilled water and then adding 120 minims of pure lactic acid.

Few ladies developed oriental sores and the modern practice of lavish use of cosmetics probably deterred sandflies from biting. Dogs were found to be infected mainly round the nose, eyes and ears, and also many dogs were found with scars resembling healed oriental sores.

Fevers of the Typhus Group.

8. TABLE 7.

	1932.		1933.		1934.		1935.		1936.	
	Admns.	R. per 1,000.	Admns.	R. per 1,000.	Admns.	R. per 1,000.	Admns.	R. per 1,000.	Admns.	R. per 1,000.
British troops	11	0·2	23	0·4	52	1·0	19	0·4	44	0·8
Indian troops	10	0·1	19	0·2	51	0·4	45	0·4	47	0·4

Forty-four cases occurred among British troops as compared with nineteen in 1935. In addition 47 cases were diagnosed among Indian other ranks. Owing to the difficulty in the differential diagnosis of certain of the mild cases without any trace of a characteristic rash the above may be under-statements. As in previous years the cases fall into three main groups on their agglutination reactions. Of 108 cases (including other categories than B. O. Rs. and I. O. Rs.) only 13 could not be classified owing to approximate rises in agglutination titres of two or more members of the Proteus OX group—*e.g.*, Proteus OXK British—29, Indian—9 ; Proteus OX 19 British—9, Indian—32 ; Proteus OX2 British—9, Indian—7 ; unclassified British—6, Indian—7.

The distribution by commands was as follows :—

	Northern Command.		Eastern Command.		Southern Command.		Burma District.	
	Brit.	Ind.	Brit.	Ind.	Brit	Ind.	Brit.	Ind.
Proteus OXK	21	4	6	1	0	2	2	2
Proteus OX 19	2	15	5	3	2	14	0	0
Proteus OX 2.	0	0	5	3	4	4	0	0
Unclassifiable	1	2	3	3	1	2	1	0
Total	24	21	19	10	7	22	3	2

Seasonal distribution was similar to 1935, the Proteus OXK group being mainly restricted to the autumn months—*e.g.*, 20 of the 21 Proteus OXK cases (British) occurred in the Simla Hill stations in August and September. The Proteus OX 19 group of cases were more or less distributed throughout the year. In Northern Command the only months in which no cases occurred were March, April and July. In Southern Command no cases were reported in February, March and June.

A possibly significant point which might affect any conclusions based on the distribution of the disease in commands and stations and also in seasonal incidence is the curious manner in which the majority of the cases occur in stations in which District or Brigade Laboratories are located. In 1936 only 9 cases seemed to occur in stations at any distance from a military laboratory. The very few cases reported among the civil population in India annually is probably similarly due to the lack of laboratory facilities for fever cases among the mass of the population. In a large number of the milder cases in the military population diagnosis without repeated agglutination tests would not have been possible.

No cases occurred in Western Command during the year.

The cases were classified according to severity :—

	B. proteus OXK.	B. proteus OX 19.	B. proteus OX2.
	Per cent.	Per cent.	Per cent.
Very mild	2·6	17·5	25
Mild	44·7	47·5	43·7
Moderately severe	28·9	30·0	6·2
Severe	13·1	5·0	25
Very severe	10·5	..	..

Symptoms were as described in the report for the previous year, *e.g.*, varying from pyrexia with headache to the severe toxic case with nervous symptoms or severe lung complications such as Lobar and broncho-pneumonia mainly among the Proteus OXK group. On the other hand there were no distinguishing symptoms among the severe cases which could be considered as absolutely diagonstic of either of the three groups. In the past the rash as regards character and distribution was given some importance in this respect, but increasing experience has shown this not to be the case, *e.g.*, among the proteus OXK cases in 1936 the limbs were involved in 6 out of nine cases in which the rash was maculopapular in type, and in 2 of these the face was also involved. "Peeling" also took place during convalescence in a few cases. Temporary dilatation of the heart is recorded among certain of the cases, and one medical officer found that in several of his cases there was a marked fall in blood pressure in the acute stages both systolic and diastolic. Wasserman tests are being carried out on an increasing number of these cases annually. In 1936, 56 cases were given several tests each, and although a small percentage of cases remained negative throughout, in the great majority particularly among the Proteus OX 19 group the test became positive at some time, sometimes early in the disease and sometimes only in convalescence—*e.g.*, of 7 good tests (British OX 19), in 6 the Wasserman tests was strong positive, and in 1 positive — of 14 good tests (Indian OX 19) 9 were ++, 2+, 2+ —, and 1 negative throughout.

The vagaries of the agglutination test as between the typhus and typhoid group in inoculated cases still gives cause for apprehension, and records of tests are being collected annually for compilation at a later date with a view to possible clarification of this question. Records are also being collected as regards agglutination reactions in non-typhus, or typhoid cases.

Six agglutination tests which exemplify most of the points in this connection, 2 typhoid, 2 typhus, 2 enteric group may be of interest.

(1) *Typhoid fever* (very mild).—10 years service. 8 times inoculated T. A. B. Bact. typhosum isolated from blood on 5th day.

Symptoms.—Pyrexia 10 days; cough chief symptom. Patient did not look ill after 2nd day.

	Titres of agglutination.					
Day after onset of disease.	6th.	10th.	16th.	20th.	23rd.	27th.
Bact. typhosum H.	175	500	1,200	3,500	2,500	3,000
Bact. paratyphosum A. H.	25	0	0	0	0	0
Bact. paratyphosum B. H.	70	25	135	150	125	125
Bact. typhosum O.	0	50	50	50	25	0
B. proteus OX2.	25	25	25	25	25	25
B. proteus OX19	25	50	25	25	0	0
B. proteus OXK.	*125*	*250*	*250*	*250*	*500*	*500*

(2) *Typhoid fever* (very severe).—7 years service. 3 times inoculated T. A. B. Bact. typhosum isolated from blood on 5 occasions. Pyrexia *30 days*, toxæmia, delirium, death.

Day after onset of disease.	Titres of agglutination. 12th.	13th.	16th.	20th.
Bact. typhosum H.	70	70	175	275
Bact. paratyphosum A.	50	55	70	100
Bact. paratyphosum B.	175	175	175	175
Bact. typhosum O.	0	0	0	70
B. proteus OX2	0	0	0	0
B. proteus OX19	35	50	70	*225*
B. proteus OXK.	80	*150*	*225*	*300*

(3) *Typhus fever* (very mild case during small epidemic in Subathu)—British soldier—10 months in India. 1 inoculation T. A. B. Pyrexia 15 days, no other symptoms except headache, pain neck and legs ; no rash ; blood cultures, urine and stool examinations negative to enteric group.

Day after onset of disease	Titres of agglutination. 8th.	10th.	14th.	26th.	33rd.	41st.	54th.
Bact. typhosum A.	60	60	135	*1,200*	*1,000*	*900*	250
Bact. paratyphosum A. H	110	135	100	150	100	50	125
Bact. paratyphosum B. H.	85	100	85	125	100	45	70
Bact. typhosum O.	50	25	0	*250*	0	25	50
B. proteus OX2	0	0	0	0	0	0	0
B. proteus OX19	50	70	70	50	50	50	50
B. proteus OXK.	0	110	2,500	3,500	6,000	3,500	1,400

(4) *Typhus fever* (severe case, during small epidemic in Subathu).—British soldier, 1 year in India. 1 inoculation T. A. B. Pyrexia 22 days, headache, injected conjunctivæ, laryngitis, drowsy, dilated heart, delirium 10th day, marked copper coloured mottling trunk and limbs 7th day, which lasted 8 days.

Blood culture, stools and urine examinations negative.

Day after onset of disease.	Titres of agglutination. 10th.	12th.	15th.	19th.	26th.	35th.	42nd.	61st
Bact. typhosum H.	0	50	45	45	30	125	25	25
Bact. paratyphosum A. H.	85	1,000	1,100	1,500	900	1,000	700	250
Bact. paratyphosum B. H.	22	45	30	100	75	50	40	40
Bact. typhosum O.	0	0	0	0	0	0	250	0
B. proteus OX2.	0	0	0	0	0	0	0	0
B. proteus OX19.	0	0	0	0	0	0	0	0
B. proteus OXK.	0	17	*50*	*35*	*50*	*50*	35	35

(5) *Enteric group* (mild case).—Indian soldier. 18 months service. 2 inoculations T. A. B. Mild pyrexia 12 days, no other symptoms. 3 blood cultures negative.

Day after onset of disease.	Titres of agglutination. 5th.	9th.	15th.	23rd.	26th.
Bact. typhosum H.	225	110	225	300	55
Bact. paratyphosum A. H.	20	250	600	500	60
Bact. paratyphosum B. H.	17	225	200	150	145
Bact. typhosum O.	0	0	0	0	0
B. proteus OX2.	0	0	50	50	0
B. proteus OX19.	0	25	*125*	50	25
B. proteus OXK.	0	25	0	25	0

(6) *Enteric group* (moderately severe case).—British soldier. 17 months in India. 1½ inoculations T. A. B. (·5 c. c. T. A. B. 5 days before onset). Pyrexia for 23 days, headaches marked, no other prominent symptoms. Blood culture, fæces and urine examinations negative.

Day after onset of disease.	Titres of agglutination. 3rd.	8th.	11th.	18th.	21st.
Bact. typhosum H.	250	*1,000*	*2,500*	*1,000*	*1,000*
Bact. paratyphosum A. H.	50	550	*1,000*	500	500
Bact. paratyphosum B. H.	50	1,000	1,000	400	500
Bact. typhosum O.	0	0	0	50	50
B. proteus OX2.	0	0	0	*225*	*250*
B. proteus OX19.	0	0	25	*200*	50
B. proteus OXK.	50	35	85	*200*	27

There were 2 deaths among the Proteus OXK group, 1 from double Lobar pneumonia and 1 from Broncho-pneumonia, also 1 death from toxaemia among those Indian cases which could not be classified owing to a general rise in agglutinins.

As in previous years, any evidence of " bites " by an insect vector was conspicuously lacking. In 1 case a small sore on the foot with lymphangitis in the leg was the cause of the patient's admission to hospital, and in 1 of the Burma cases the patient stated that he had removed a tick from his body some days before admission.

Digestive Diseases.

9. The steady decrease in these diseases during the past few years has not been sustained, there having been 5,362 admissions compared with 5,014 in 1935.

	1935.	1936.
Tonsillitis	1,494	1,516
Diarrhœa	734	859
Pharyngitis	420	462
Appendicitis	423	385
Gastritis	307	357
Constipation	332	339
Piles	195	205

Tonsillitis still heads the list of digestive diseases and it is fourth on the list of diseases causing admissions to hospital. If tonsillitis and pharyngitis, with which it is closely associated, are taken together they constitute the third most important cause of sickness.

Enteric group of fevers.

10. The incidence of enteric fevers among British and Indian troop during the years 1934-36 is shown in table 8.

Enteric Fevers.

TABLE 8.

British.

	1934				1935				1936			
	Actuals.		Ratio per 1,000.		Actuals.		Ratio per 1,000.		Actuals.		Ratio per 1,000.	
	A.	D.	A.	D.	A.	D.	A.	D.	A.	D.	A.	D.
Typhoid	27	5	0·5	0·09	27	3	0·5	0·15	14	2	0·3	0·04
Para. A	8	...	0·1	...	13	...	0·2	...	13	...	0·2	...
Para. B	...	...	...	...	...	...	...	...	1	...	0·02	...
Para. C	1	...	0·02	...	...	...	...	...	1	...	0·02	...
Enteric group	55	2	1·01	0·04	66	1	1·3	0·02	47	1	0·9	0·02
Total	91	7	1·7	0·13	106	9	2·0	0·17	76	3	1·5	0·06

Indian.

	1934				1935				1936			
	Actuals.		Ratio per 1,000.		Actuals.		Ratio per 1,000.		Actuals.		Ratio per 1,000.	
	A.	D.	A.	D.	A.	D.	A.	D.	A.	D.	A.	D.
Typhoid	78	11	0·66	0·09	55	8	0·5	0·07	29	3	0·2	0·03
Para. A	45	...	0·38	...	46	3	0·4	0·03	14	...	0·1	...
Para. B	4	...	0·03	...	1	...	0·01	...	1	...	0·01	...
Para. C	2	...	0·02	...	...	...	...	...	...	...	...	...
Enteric group	93	4	0·8	0·03	62	2	0·5	0·02	33	2	0·3	0·02
Total	222	15	1·9	0·13	164	13	1·4	0·11	77	5	0·7	0·04

In 1934 the incidence was the lowest ever recorded, but again this record has been broken by the even greater reduction in 1936, which is particularly striking among Indian troops. It is possible that a portion of the reduction among enteric group cases is due to increasing knowledge of the mild typhus group cases, but this would not apply to the great reduction in both Typhoid and Para-typhoid A group (Indian) which occurred during the year and the ratio per 1,000 for typhus fever (Indian) is identical with that in 1934. The numbers of deaths in both British and Indian from enteric fever are also greatly reduced. There has been no corresponding reduction among the civil population but rather an increase, and although strict attention to the general hygiene of military areas is very much to the fore, there have been no dramatic changes in this respect. Increasing interest is being taken by all Indian units as regards child welfare among their families and numbers of enteric group cases who previously would have escaped notice are now being brought to light and properly treated. It is possible therefore that another focus of infection is being eliminated. The main answer however appears to be in the improvement in the T. A. B. vaccine both from R. A. M. College, and the Central Research Institute, Kasauli, which has taken place during the past few years.

In the 1935 report attention was drawn to the increasing number of apparently ambulant infections among the fatal typhoid cases. One of the two British fatal cases (typhoid) in 1936 suffered from perforation of the ileum on the 9th day after admission to hospital which healed spontaneously. On the 16th day pulmonary embolus occurred, followed by broncho-pneumonia from which he was also recovering. He then had a severe relapse and eventually died as the result of a perforation of the coecum. Agglutination results in this case showed no rise in either TH, or T. O. agglutinins. The second case died of toxæmia also during a relapse.

The comparative incidence, death rate and case mortality among British soldiers with under one year's service, and over one year's service in India is given in table 9.

TABLE 9.

	Under one year in India.						Over one year in India.					
	Strength.	Cases.		Deaths.		Case mortality %.	Strength.	Cases.		Deaths.		Case mortality %.
		Actuals.	Ratio per 1,000.	Actuals.	Ratio per 1,000.			Actuals.	Ratio per 1,000.	Actuals.	Ratio per 1,000.	
Average for 1929—1933 .	10,632	30·2	2·84	7·2	0·68	23·84	44,814	32	0·71	3·6	0·08	11·24
Average for 1934—1935 .	10,909	7	0·65	2	0·18	28·57	42,628	20	0·47	4·5	0·11	22·5
1936 . .	9,711	6	0·62	...	...	...	42,348	8	0·19	2	0·05	25

The six-monthly periods after inoculation at which infection occurred are shown in table 10.

TABLE 10.

	Total Enteric group of fevers			Typhoid cases bacteriologically proven.		
	0—6 months. Per cent.	6—12 months. Per cent.	12—18 months. Per cent.	0—6 months. Per cent.	6—12 months. Per cent.	12—18 months. Per cent.
1929 . .	32·2	50·5	17·5	31·2	58·3	10·4
1930 . .	37·6	43·6	18·8	32·7	46·6	20·7
1931 . .	35·4	35·4	29·2	34·4	34·9	30·2
1932 . .	33·7	38·0	28·2	30·9	45·4	23·6
1933 . .	32·0	44·0	24·0	25·0	45·8	29·2
1934 . .	33·7	35·1	31·1	40·0	24·0	36·0
1935	30·0	43·3	26·6	21·7	43·4	34·7
1936 . .	32·3	40·0	27·7	15·4	30·8	53·8

For the total enteric group of fevers the percentages are similar to previous years for the various post-inoculation periods, but in the bacteriologically proven typhoid cases, there is a big drop in the percentage of cases occurring in the first six months after inoculation, and a distinct rise in the percentage in the 12—18 months period.

The results obtained by agglutination tests are similar to those obtained in previous years both as regards " H " and " O " agglutination, *e.g.*, inconclusive. Comparative tests are being carried out on as many cases as possible in all military laboratories, between Dreyers technique and that of Felix with standardised T. O. suspensions. Sufficient data are not yet available to base definite opinions on except that in the great majority much higher titres of " O " agglutination are shown to be present by the latter method.

TABLE 11.

Fevers of Enteric Group—Inoculation state among British other ranks—1936.

Group.	Strength.	Actuals.		Ratio per 1,000.		Case mortality per cent.
		Cases.	Deaths.	Cases.	Deaths.	
Protected . .	50,655	65	3	1·3	0·06	4·62
Unprotected . .	645	11	..	17·1	..	..

TABLE 12.

Incidence of fevers of the enteric group among protected and unprotected British Officers, Other Ranks, Women and Children.

		Average strength	Admissions. Typhoid.	Para. A.	Para. B.	Para. C.	Enteric group.	Total.
British officers (British and Indian service)	Protected	4,236	..	3	..	..	..	8
	Unprotected	286	1	..	..	..	4	
British other ranks.	Protected	50,655	13	10	1	1	40	76
	Unprotected	645	1	3	..	..	7	
Women	Protected	5,631	1	1	..	..	1	9
	Unprotected	330	4	..	..	..	2	
Children	Protected	6,394	4	..	..	..	..	10
	Unprotected	1,096	5	..	..	..	1	

Dysentery, Diarrhœa, Colitis and Amoebic Hepatitis.

11. *Incidence of Dysentery, Diarrhœa, Colitis, and Amoebic Hepatitis during 1933—1936.*

TABLE 13.

	Dysentery.		Diarrhœa.		Colitis.		Total.		Amœbic Hepatitis.		Liver abscess.	
	Actuals.	Ratio per 1,000.	Actuals.	Ratio per 1,000.	Actuals.	Ratio per 1,000.	Actuals.	Ratio per 1,000.	Actuals.	Ratio per 1,000.	Actuals.	Ratio per 1,000
1933	1,369	24·9	842	15·3	53	1·0	2,264	41·2	36	·65	7	·13
1934	1,389	25·5	811	14·9	42	0·8	2,242	41·2	52	·96	5	·09
1935	1,536	29·2	734	13·9	19	0·4	2,289	43·5	24	·46	4	·08
1936	1,283	24.6	859	16·5	49	0·9	2,191	42·1	15	·29	2	·04

During 1936 the admission ratio for dysentery decreased by 4·6 per 1,000 as compared with 1935 and is the lowest for some years. This is however offset by an increase in admissions for diarrohœa and colitis leaving a decrease of 1·4 per 1,000 for the whole group of diseases. Reduction also occurred in admissions for amœbic hepatitis, and only two cases of liver abscess were admitted during the year.

Cases were as usual sporadic and no epidemics occurred.

The fly season corresponded as usual with the greatest incidence of the cases and in Northern Command it was noticed that units arriving recently in stations after train journeys produced small crops of cases. The fact that this group of diseases is under peace conditions largely passed on from the insanitary conditions prevailing among the civil community was stressed in the 1935 report.

The striking range of the fly and the absence of any reliable method of producing active immunity against the numerous varieties of dysentery bacilli prevalent among the population of India accounts mainly for the fact that the admission rate to hospital among British troops is in the year 1936 still as high as 42·1 per 1,000 as compared with an admission rate of 1·5 per 1,000 for the enteric group of fevers.

The extent of the infection among the local population may be gauged by the fact that during the routine examination of menials prior to employment the majority of pathogenic bacilli discovered are mainly of the Flexner and Shiga group.

The percentage of dysentery cases diagnosed bacillary, bacillary exudate, protozoal and clinical dysentery throughout India during any one year now varies very little.

TABLE 14.

	1934.		1935.		1936.	
	Admissions.	Percentage.	Admissions.	Percentage.	Admissions.	Percentage.
Dysentery Protozoal	163	11·74	158	10·3	138	10·8
Dysentery bacillary (bacteriologically proved) . .	513	36·93	637	41·5	592	46·1
Dysentery bacillary Exudate (typical Exudate, but no organism isolated)	383	27·57	353	23·0	288	22·4
Dysentery Clinical .	330	23·76	388	25·3	265	20·7

The ratio per 1,000 of the above groups in Commands is shown in table below. It will be seen that as regards ratios of Bacillary and Protozoal infections there is little difference between command figures, except in Northern Command where amœbic infections were less prevalent than in the other three Commands. In the main there is little variation between Districts also. Baluchistan District (Quetta) however had the high admission ratio of 37·6 per 1,000, and Poona Brigade Area a ratio of 34·9 per 1,000. As regards the latter the remarks of A. D. H., Southern Command quoted above probably supply the reason. Among Indian troops during the year the percentages of the different types were very similar to the British troops, *e.g.*, Dysentery Protozoal 5·8%, Bacillary dysentery 51·14%, Bacillary exudate 24·78%, Dysentery clinical 18·20%.

Dysentery—Admission ratio per 1000.

Command.	Bacillary.	Bacillary exudate.	Protozoal	Clinical.	Total.
Northern	6·9	4·0	1·8	8·1	20·9
Western	12·5	5·0	2·5	15·3	35·3
Eastern	13·8	6·5	3·3	4·0	27·7
Southern	14·0	6·3	2·3	0·8	23·4

The various types of dysentery bacilli isolated from cases also show little change during the past four years. This year there has been a general increase in isolations which is satisfactory, and every year the numbers of the B. sonne infections discovered increases. Since the strains identified by Boyd have become recognised in military laboratories and the scheme for identification of dysentery groups brought into being by him has come into general use the so-called "inagglutinable Flexner bacilli", which were reported on annually in laboratory reports of military laboratories, have to all intents and purposes ceased to exist.

TABLE. 15.

Analysis of Organisms isolated from Specimens submitted to Laboratories during the last four years.

	Non-mannite fermenting.			Mannite fermenting.					
Year.	Shiga.	Schmitz.	Total.	Andrews' type.	Sonne.	New types.	Unclassified.	Total.	Percentage Unclassified.
1933 . .	253	80	333	960	198	315	91	1,564	5·8
1934 . .	191	95	286	921	202	313	27	1,463	1·8
1935 . .	230	106	336	798	292	392	10	1,492	0·7
1936 . .	261	131	392	814	337	383	9	1,543	0·6

Tropical abscess of the liver and hepatitis.

12. There were 51 admissions for hepatitis of which 15 were considered as definitely amœbic in origin, and 19 in which the cause of the hepatitis was doubtful. There were only two cases of tropical abscess both of whom recovered.

Cholera.

13. A mild epidemic of 5 cases occurred in the Sergeants' Mess, Fort William, Calcutta, at the end of May. Examination of food, vegetables, ice and minerals did not reveal any source of infection but on examination of the members and staff of the Sergeants' Mess it was found that a Drum-Major was a cholera carrier. Vibrios morphologically and bio-chemically resembling V. choleræ were also isolated from a sergeant, two of the Indian staff of the mess and an Indian in the mineral water factory. On serological investigation these vibrios were proved not to be true V. choleræ.

Stool examinations of the remaining members and staff of the mess and mineral water factory gave the following rather striking results :—

One sergeant—2 Indian cooks—dysentery bacillary exudate.

One sergeant—indefinite exudate.

One Indian waiter—vegetative forms of E. histolytica.

One sergeant and one Indian wash-up boy—Tænia Solium.

Three Indians in mineral water factory—varied helminthic infestations.

Cysticercosis.

14. One case occurred at Trimulgherry and was invalided to England. The man was a pork butcher in England before joining the Army. On reporting sick for a minor injury of the hand he was found to have subcutaneous nodules in various parts of his body and he stated that these had been present for seven months. Subsequently he had an epileptiform fit.

In addition to this case of cysticercosis 17 cases of epilepsy were invalided home during the year without any association with cysticercosis being discovered.

There were 17 cases of Tænia Solium infestation treated during the year, compared with 24 during the previous year.

Venereal Diseases.

15.

TABLE 16.

Year.	Gonorrhœa	Syphilis.	Soft-chancre.	Total.
1932	26·1	6·0	5·5	37·7
1933	23·2	4·9	5·0	33·4
1934	25·2	4·5	4·1	34·1
1935	25·8	6·0	6·8	38·8
1936	25·7	4·1	4·6	34·4

Owing mainly to a reduction in Burma the admissions for venereal disease are lower than last year and slightly lower than the average of the last five years.

Burma District still supplies the majority of cases although there has been a steady decrease in that District in the last three years.

The treatment of gonorrhœa followed the usual routine lines with potassium permanganate (1 in 12,000—20,000). In chronic cases with " morning gleet " irrigation with 1/4000 zinc sulphate solution gave good results. Polyvalent vaccines received from Woolwich are still under trial and so far are favourably reported on.

The specialist in Dermatology, Lahore District, in an endeavour to cut short the duration of chronic cases of gonorrhœa by raising the body temperature, used intravenous injections of T. A. B. vaccine. Results were disappointing, possibly because the selected cases were all very chronic, and also because the height or duration of the increased body temperature could not be gauged for any given dose of T. A. B. Vaccine as patients reacted differently, influenced possibly by their previous inoculation history.

The average number of days in hospital for gonorrhœa was 47·12. The percentage of relapse cases was 23·3.

Dmelcos vaccine has again been reported on very favourably for cases of soft chancre and it has now been placed on an ",as required " scale of issue.

Diphtheria.

16. The number of cases occurring among British Army during 1936 were :—

Officers=3.

Other Ranks=66.

Other Ranks' Wives=6.

Other Ranks' Children=58.

Q.A.I.M.N.S.=1.

The outbreak in a battalion on the N. W. Frontier, reported last year continued until February of this year, six cases occurring in January and one in February.

Although throat swabs were taken of the whole battalion during the previous month further swabbing in January produced six more virulent carriers.

The necessary materials having been obtained by air mail from England, Schick-testing and immunisation of positively reactors were carried out, 197 (27% of the battalion strength) being immunised. Three months after immunisation previous positively reactors were again Schick-tested but only 3% gave positive reactions.

This outbreak demonstrates the value of Schick-testing and immunisation for, in spite of extensive swabbing and isolation of carriers, it was not until immunisation had been completed that further cases ceased to occur.

Immunisation was also carried out among school children at Kirkee as several carriers were discovered. The non-virulent carriers were sent to their homes but the virulent carriers were isolated in hospital. In spite of gargling, fresh air and tonsillectomy, 4 children remained carriers up to 4 months.

Cerebro-spinal fever.

17. One case occurred among British troops in Rawalpindi. This case was severe and resulted in death in spite of energetic treatment with Group I antimeningococcus serum given intravenously, intrathecally and intramuscularly.

There were 16 cases with 4 deaths among Indian other ranks and 4 cases with 3 deaths among Indian followers.

Of 14 strains of meningococci cultured 11 were found to belong to Group I (types I or III). The remaining 3 strains were not typed.

Smallpox.

18.

TABLE 17.

Half yearly state of vaccination of British troops and families.

	31st March.	30th September.
British Officers	98·96	96·73
British Other Ranks	99·65	99 69
Women and Children	99·09	98·09

There were 7 cases of small-pox during 1936, compared with 8 in 1935. Four of the cases were among British Other Ranks, one was a British Officer and the remaining two were children of British soldiers. One child aged 4½ years had been vaccinated eight times but always unsuccessfully. The other, aged 11 months, had not been vaccinated as the mother refused. Both of the children and one of the British Other Ranks, who had been re-vaccinated in 1933, died.

All the cases occurred between the months of Feburary and May and no two cases occurred in the same station.

Respiratory diseases

19. The number of admissions for respiratory diseases, other than pulmonary tuberculosis, was 1,210 or 23·2 per 1,000 being practically the same as in 1935.

There were 132 cases of lobar pneumonia with 14 deaths compared with 164 cases and 19 deaths in 1935. Out of 51 cases of broncho-pneumonia there were 6 deaths. There were 834 admissions for bronchitis and 90 for pleurisy.

Tuberculosis.

20.

TABLE 18.

	Pulmonary tuberculosis.		Tuberculosis other than Pulmonary.
	Actuals.	Ratio per 1,000.	Actuals.
Admissions	57	1·1	9
Deaths	1	0·02	..
Invalids	63	1·21	9

There were 3 more cases and 2 less deaths but 28 more invalids for pulmonary tuberculosis than in 1935. The cases were distributed throughout India, although Southern Command gives a somewhat higher ratio of infection than the other Commands. There was also no higher incidence in any one unit.

Areolar Tissue and Local Injuries.

21. Although there has been a decrease of 512 or 9·3 per 1,000 in admissions for cellulitis this disease is still second only to malaria in the causation of admissions to hospital. There were 473 admissions for boils, this figure being the same as in 1935.

Sprains, contusions and abrasions constituted the majority of local injuries for which there were slightly fewer than in the previous year. Local injuries accounted for 31 deaths, this being one less than in 1935.

Experiments were carried out in certain stations in Northern Command during the hot months with a view to ascertaining whether an increased ration of " salt " to replace chloride deficiency due to the excessive sweating would reduce the number of skin infection during these months. Individual reports indicated that increased salt intake was thought to be of benefit, but they were of so general a nature that no safe conclusions could be drawn.

Effects of Heat.

22. There were 13 cases of heat-stroke with 3 deaths, and 39 cases of heat-exhaustion with 1 death. The number of cases of heat-stroke is 2 more than in 1935 but there were only half the number of cases of heat-exhaustion.

As in previous years the majority of cases occurred in Northern Command. The hot weather was not quite as severe, nor did it last quite as long as the previous year. In Northern Command the normal hot weather moves to the hills were not interrupted by civil disturbances. Attempts were made in this Command to reduce the number of hours spent by the men in their barrack rooms, as it is considered that long hours without employment in dull barrack rooms, during the hot weather, have a very definite adverse psychological effect on the troops. Reveille was held at a later hour to enable men to get more sleep in the cool early hours of the morning. Work was carried on out of doors, in the shade as much as possible, during the morning. The hot dinner was also postponed until the evening and a light mid-day meal given instead.

Another innovation was to send troops out into bivouac for 24 hours in the middle of the hot weather, under medical supervision. No ill effects resulted, and the troops liked it as a relief from the monotony of barrack life in the hot weather.

Mental Diseases.

23.

TABLE 19.

	1932.	1933.	1934.	1935.	1936.
Total Mental Diseases . .	65	195	152	168	145
Schizophrenia . . .	17	26	20	23	20
Feeblemindedness . . .	11	10	8	6	13
Manic depressive psychosis. (Acute mania and depression)	13	9	8	7	11
Hysteria	50	68	51	62	54
Neurasthenia . . .	67	40	24	24	18
Anxiety neurosis . . .	..	6	8	14	15
Psychasthenia . . .	8	5	6	5	5

NOTE.—Before 1933 psychoneuroses were shown as nervous diseases.

There were 145 cases or 2·8 per 1,000 admitted for mental disease, compared with 168 cases or 3·2 per 1,000 in 1935. Of these admissions 46 were invalided to the United Kingdom and an additional 46 remaining from 1935 were also invalided during the year.

The diseases shown in the above table are those constituting the majority of admissions for mental diseases.

Hysteria was the chief mental disease but 75% of the cases were returned to duty. One case was admitted twice for hysteria and subsequently returned to duty on both occasions but was later re-admitted as a case of manic depressive psychosis.

Soldiers with less than 6 months in India were, as might be expected with their changed conditions of life, most affected. The admissions for mental diseases according to length of service in India were :—

	Per 1,000.
Under six months	20·04
Six months to 1 year	2·15
1 to 2 years	3·08
Over 2 years	2·18

The high percentage of cases under six months' service in India is made up by hysteria 10, anxiety neurosis 2, neurasthenia 1, temperamental instability 1, feeble minded 2, schizophrenia 1, manic depressive psychosis 1.

HYGIENE.

Military Food Laboratory, Kasauli.

24.

TABLE 20.

Summary of work done during 1936.

Source of samples.	Received.	Accepted.	Rejected.	Percentage of rejections.
On tender or for acceptance.				
From overseas . . .	322	218	96	29·5
Indian products . . .	1,153	617	335	29·1
Grains from grains depots .	3,121	3,037	67	2·1
Wheat from Government controlled mills . . .	620	620	..	..
Bran from other than controled mills	1,134	978	156	13·8
Ghi from Ghi Heating Centre, Agra	3,824	3,823	1	0·03
Stocks purchased without reference to the Military Food Laboratory . . .	181	143	11	6·1
From R. I. A. S. C. stocks.	1,476	1,439	8	0·5
From units for advice . .	1,227	909	190	15·5
Total .	13,058*	11,784	863	6·6

Specially prepared ascorbic acid tablets were analysed and found to contain ample ascorbic acid for the prevention and cure of scurvy. Storage tests of these tablets are still in progress.

A new specification for meat extract has been produced in place of essence of beef to provide a true meat extract with a high proportion of meat and a low percentage of salt.

* In 411 cases further samples were called for.

Early consignments of a particular brand of tinned milk appeared to be blown but the contents of the tins were found to be sterile and in good condition. The air in the tins did not differ from atmospheric air. Representation to the manufacturers resulted in improved packing and there was no further complaint.

Supplies of rice from Burma continued to be unsatisfactory and large stocks were condemned. The Officer-in-charge supplies, Rangoon, underwent a course of instruction at the Military Food Laboratory in September and since his return to Burma rice supplies have improved.

In September an outbreak of 260 cases of epidemic dropsy occurred among Indian troops stationed at Mingaladon and Rangoon, Burma. Infection of rice supplies was suspected and on discontinuing the existing supplies no further cases occurred.

Analysis of the particular supply of rice showed it to be superior in quality to normal supplies but to be in bad condition, having a bad smell and being full of weevils and maggots. Supplies of this rice were destroyed and godowns in which it had been stored were disinfected.

In November an outbreak of food poisoning occurred in a British battalion in camp and investigation showed that the probable cause was due to fish cakes made from tinned salmon. The actual tins of salmon from which the cakes were made were not available and a sample tin from the same pack was reported to be sound by the Military Food Laboratory. Eventually it was considered that there may have been one bad tin or adulteration may have taken place in the make up of the fish cakes by the contractor's staff.

Succinchlorimide tablets for sterilisation of small quantities of water were tested and found to be very satisfactory. Storage tests are now being made and if the tablets are found to be sufficiently stable their issue for chlorination of individual water bottles will be considered.

Ventilation of British Troops Cookhouses.—The A. D. H. & P., Northern Command, carried out experiments in Ferozepore and Multan during July to ascertain the atmospheric temperatures which had to be endured under working conditions in British cookhouses. Inspite of overhead electric fans the indoor dry bulb temperatures were ten degrees higher than the outdoor and wet bulb temperatures exceeded the point at which respiration and pulse were accelerated in a sitting man.

As a result of these experiments exhaust fans have been authorised in British cookhouses in certain stations in addition to overhead electric fans.

Air Conditioning.—The experiments carried out last year for air conditioning the B.M.H. Delhi by means of khus-khus screens and fans were considered successful. The experiments this year have been further extended to hospitals at Cawnpore, Lucknow, Jhansi and Lahore.

Quarters and Barracks.—A sum of Rs. 8,84,000 was provided for improvements to existing and provision of new married quarters for British personnel in Northern and Eastern Commands.

Improvements to and provision of new dining halls and cookhouses for British troops have been made in three Commands.

Water Supplies.—Independent military water supplies have been provided at several stations and improvements to water supplies and purification methods at other stations have been carried out to the limit of available funds

Swimming Baths.—The provision of more and better swimming baths for troops has been and still is under consideration. The supply of bleaching powder and copper sulphate for purification of swimming bath water as well as water for other domestic supplies has been regularised.

With the aid of a loan from official sources the Bishop Whitehead Institute at Secunderabad has constructed an up-to-date swimming bath of 170,000 gallons capacity with continuous filteration and chloramination. This has proved a great boon and is very popular with the troops and their families.

Treatment of sullage water.—Lieut.-Colonel T. O. Thompson, R.A.M.C., devised an apparatus for the semi-automatic treatment of sullage water by Hattersley's chemical method of precipitation with ferrous sulphate and lime. The apparatus and process has been fully described in an article published in the R. A. M. C. Journal.

The effluent from cookhouse or bathhouse runs into a tipping tank which when full empties itself into a mixing tank. The tipping over of the tipping tank causes a dose of ferrous sulphate and lime from two separate receptacles to be delivered simultaneously into the mixing tank where flocculation of the sullage water then takes place.

This apparatus would be useful in places where there are central cookhouses and bathhouses, but in India where there are several such buildings in each set of lines the system would probably not be economical.

Piggeries.—Efforts have continued to be made to improve the supply of pork and pig products to troops and families but the question presents many difficulties.

The ideal aimed at is to have satisfactory pig styes in which pigs are kept for 3 months before slaughter branding and registration of pigs; careful inspection of meat for cysticerci and stamping of all meat offered for sale or manufacture of sausages, pies, etc. and medical examination of all piggery personnel and food handlers for tape worm infestation.

Unfortunately there are many ways in which fraudulent dealers can perpetrate fraud. Branding irons and meat stamps can easily be copied in the bazaar and systematic examination of the flesh entails so much cutting as to render it unfit for sale. Moreover, inspite of all precautions, there are no means of preventing families from buying from hawkers who visit quarters at night.

Conservancy.—Work on the provision of a water-carriage conservancy system for Fort William Calcutta has been started.

The provision of septic tanks for disposal of sewage from quarters has been extended and a similar system is being installed for the British Military Hospital, Rawalpindi.

Experiments carried out last year for fly proofing latrines at Rawalpindi proved satisfactory and all British latrines in that station have now been fly proofed.

Disinfection.—The new Ordnance pattern portable disinfector has proved successful and the question of its issue to sanitary sections in place of Thresh disinfectors is now under consideration.

Periodic disinfection of blankets has been a general practice in most stations but a regulation has now been issued for all blankets to be disinfected regularly every six months.

Khaisora operations.

25. Wazir force was formed and concentrated at Mir Ali on December 6th to undertake punitive operations in Waziristan as a result of attacks by tribesmen on two columns which were making a demonstration peace march in the Khaisora Valley on 25th November.

The force operated in three columns establishing camps from which punitive measures and road construction were carried out.

The average daily sick rate for the whole force, British and Indian was 1·99 per 1,000 and the ratio per 1,000 admissions to hospital for British troops was 278·3. This hospital admission rate compares very favourably with that in the Mohmand operations 1935 which was 668·8 per 1,000 but it must be remembered that the Mohmand operations were carried out at the worst time of year when malaria was rife.

Sanitation of camps was good once they were organised but in many cases, especially at Mir Ali during the concentration period there was a certain amount of disorganisation. This again points out the necessity of Sanitary Sections being among the first units to arrive in concentration areas.

Pathology.

26. The routine work in military laboratories has increased during the year. 184,814 specimens were sent for laboratory examination, 24,814 more than in 1935. Work in the clinical side-rooms of the majority of hospitals also increases annually. As an example 24,567 examinations were carried out in the hospital clinical side-rooms in Peshawar in 1936. Included in this number are however 17,522 blood films. This type of work is similar to that carried out in side-rooms of hospital wards in England, but includes large numbers of examinations for malaria parasites, examinations of dysentery exudates, and stool examinations for cysts or vegetative forms of protozoa.

Enteric Group.—As always, examinations of blood, serum, stools, etc., in connection with enteric group and typhus fever group proved a large part of the routine work in all laboratories. Blood cultures reached the high figure of 4,256 and in the majority of cases were taken at a suitable period after the onset of pyrexia. Percentage of contaminated blood cultures received in the laboratories varied much in different stations, but the average for all India was 16·9 per cent.

In this connection a small series of experiments were carried out by Lieut.-Colonel Bridges in an endeavour to reach a conclusion as to the real effect of extraneous organisms on Bact-typhosum in blood culture. Blood cultures proved sterile after 10 days incubation were used for the tests, Bact-typhosum being the specific organism, while contaminating organisms were staph albus and aureus, Bact. coli and B. subtilis. The results were somewhat surprising particularly as regards staphylococci the usual contaminating organism encountered, in that, except in two cases, Bact. typhosum outgrew and killed the contaminating organism leaving a pure growth of typhoid bacilli. Staph. albus was more easily killed than Staph. aureus. In one case the latter and Bact. typhosum grew harmoniously together. In one case both died out leaving the culture sterile. Bact. typhosum and B. subtilis grew harmoniously together with no apparent effect on the growth of either, but in every case in which Bact. coli was used for contamination it outgrew and destroyed Bact. typhosum.

Contamination by staphylococci as a cause of negative blood culture in typhoid fever cases appears from the above to have been exaggerated. On the other hand the D. A. D. P., Lahore District, stresses the high number of contaminated blood cultures received in his laboratory, and states, "In no case has the causative organism been recovered from a blood culture which has been received contaminated in laboratory.

A perusal of many hundreds of records of cases only confirms the necessity for early and "*repeated*" blood culture particularly in a much inoculated population. In quite a reasonable percentage of cases a positive blood culture has been obtained from the 3rd or 4th consecutive culture while the first two or three cultures have been sterile or contaminated with staphylococci. In view of increasing experience as regards the anamnestic reactions obtained with "H" and to a lesser extent with "O" agglutination in particular in connection with the Enteric and Proteus OX groups, and the comparatively poor results obtained by stool and urine examination in the former, blood culture remains the one really satisfactory method of laboratory diagnosis. One bacteriologist suggests that his poor results from stool examination in typhoid cases may be due to the fact that in a highly inoculated and re-inoculated population frank ulceration of Peyers patches seldom occurs with the result that fewer bacilli find their way into the bowel contents than is the case with uninoculated individuals. Certain typhoid cases are discovered annually in which a few days mild fever, and possibly a slight headache are the only symptoms, so there may possibly be something in the view, although many other factors are involved both from the hospital and laboratory side of this question.

In a country such as India where "fever cases" of unknown origin in the early stages bulk so prominently among hospital admissions the agglutination test is a mixed blessing as far as the laboratory worker is concerned. In 1936 tests up to a varying number for each case were carried out on 2,252 cases, which turned out to be due to other conditions than the enteric or typhus group. The number of suspensions required in each test has increased during the past few years, and laboratories as a routine put up serum against T(H) A(H) B(H), T(O), Proteus OX2, OX19, OX(K), Br. melitensis. Some in addition add A(O) B(O) and Proteus OX(M), a strain of Proteus from the Muktesar laboratory, which frequently shows similar agglutination to Proteus OXK, sometimes even in higher titre. A further strain has been now thrown on the laboratories owing to the fact that because of the discrepancy in agglutination titres obtained by the technique of Felix employing dead suspensions in wide bore agglutination tubes, and that of Dreyer in Dreyer's tubes, they have been asked to carry out as many comparative tests as possible on the same serum from enteric and typhus fever cases, and also, because of the unsatisfactory position as regards anamnestic reactions, to carry out comparative tests on conditions definitely known not to be enteric or typhus. The results will be compiled at the end of 1937, but there is no doubt that in many cases the end titre of agglutination is found in a far higher dilution by the Felix method than the Dreyer. Whether this will prove to be any advantage can only be shown by further experience.

A new Salmonella type bacillus from a case in Poona (1935) was reported by Lt.-Col. Bridges in the R.A.M.C. Journal under the name of Bact. Kirkee. The H. antigen of this bacillus is identical with that of Bact. paratyphosum B but its "O" antigen differs from that of any known organism. This organism will presumably be included in future editions of Kauffman-White scheme.

Bact. paratyphosum C was isolated from four cases, two of them being discovered during routine examinations of menials for carrier condition.

Every year a number of organisms are isolated from the blood of pyrexia cases and reported as Bact. alkaligenes (B. faecalis alkaligenes). In the District Laboratory Rawalpindi alone twelve such were isolated during the year from Typhus fever cases. No relationship has ever been shown between these strains and that obtained from the national collection of type cultures, which is indeed so autoagglutinable as to be almost unmanageable. Moreover no organism isolated in India has ever been found to be identical with this. A strain from Ranikhet which produced suitable agglutinating serum and O and H suspensions was isolated in 1935 from a fever case. This strain unfortunately died, but another suitable strain was recovered in Ranikhet again during 1936. Agglutinating serum and H and "O" suspensions have been supplied to all laboratories who have been asked to keep a look out for similar strains.

The results of an investigation carried out by Major H. J. Bensted in the District Laboratory, Rawalpindi, on the virulence of B. typhosum isolated from blood cultures were published in the R. A. M. C. Journal.

In brief he finds that—

(1) In 100 consecutive cases 16% were of the highest virulence, 59% of medium virulence and 25% low virulence.

(2) Cases of normal clinical severity are normally produced by organisms of medium virulence. But mild or very severe or fatal cases do not show any well defined relationship in the virulence of the organisms to the severity of the disease.

(3) Virulence changes are noted similar to those found in experimental infection in mice.

(4) VI-antigen was demonstrated in all the strains from the blood.

(5) Five "Carriers" were all found to be excreting organisms of the highest virulence.

Routine examination of menials for a possible carrier condition resulted in the isolation of Bact. typhosum 10, Bact. paratyphosum A 6, Bact. paratyphosum C 2.

Owing to the difficulty of obtaining fluid stools from these individuals these examinations are always considered to be unsatisfactory, and results largely depend on the personal interest taken in the matter by the medical officer in charge of the hospital and laboratory.

Dysentery.—Specimens from 3,767 cases were investigated during the year in the laboratories in addition to specimens from 3,290 diarrhœa cases.

Among the dysentery cases 2,355 were found microscopically to be typical exudates of Bacillary dysentery, and 1,413 to be indefinite in type. In all 13,754 bacteriological examinations were carried out on these cases. 212 were cases of amœbic dysentery and 17 were mixed amœbic and bacillary in origin. During routine examination of menials for the carrier condition the following dysentery group organisms were isolated—B. shiga 15, B. flexner 21, B. sonne 11, B. schmitz 1, B. newcastle 1, B. enteritidis 1. The latter bacillus is seldom encountered in dysentery cases in India, but when is present it appears to cause a severe and protracted type of dysentery. Once such case which was quite irresponsive for weeks to routine treatment, recovered rapidly after the administration of an autogenous vaccine.

The various types of bacilli recovered during 1936 are shown in Table 21.

TABLE 21.

Analysis of Organisms isolated from Specimens submitted to Laboratories during the last five years.

Year.	Non-mannite fermenting.			Mannite fermenting.					
	Shiga.	Schmitz.	Total.	Andrewes' types.	Sonne.	New types.	Unclassified.	Total.	Percentage unclassified.
1932 . .	384	126	510	1,007	106	126	152	1,393	10·9
1933 . .	253	80	333	960	198	315	91	1,564	5·8
1934 . .	191	95	286	921	202	313	27	1,463	1·8
1935 . .	230	106	336	798	292	392	10	1,492	0·7
1936 . .	261	131	392	814	337	383	9	1,543	0·6

Laboratories vary considerably as regards their percentage of positive isolations from bacillary dysentery cases. The technique in all laboratories should be identical, but the percentage of positive isolation depends as much on attention to detail in the laboratory as on the organisation in the hospitals for rapid despatch of fresh specimen to the laboratory, or for placing samples of muscus quickly into the glycerine and saline solution in the case of out-stations. The following results from military laboratories in Northern Command may be taken as more or less representative of the results in other commands also, some very good, mostly good, and one or two poor.

TABLE 22.

Laboratory.	Total cases.	Typical Bacillary exudate.		Indefinite exudate.	
		Cases.	Percentage positive results.	Cases.	Percentage positive results.
Peshawar	311	149	59	162	31
Kohat	120	72	75	48	50
Rawalpindi	347	199	61·3	147	17
Lahore	134	81	74	53	24·5
Razmak	112	81	82	31	41·9
Ambala	87	35	60	52	21
Sialkot	71	25	20	46	15·2
Bannu	47	27	88·9	20	50
Kasauli	32	15	100	17	70

The scheme in use in military laboratories for the classification of strains of dysentery bacilli isolated was fully described in the report for 1935. The point has been raised as to whether even this very complete scheme is sufficient without absorption tests being carried out on all the strains of the Flexner and Boyd strains isolated. It is considered however that the practical results obtained would not be commensurate with the large amount of extra work thrown on already busy laboratory staffs.

The number of B. sonne isolations increases annually. In Colaba, Bombay 50% isolations were of this bacillus. It is probable that much of the " green diarrhœa " in children in India is due to this bacillus as well as B. flexner-

Of 4 infants who died in Colaba from this condition 3 were found to be sonne infections.

Food poisoning.—An interesting investigation was reported by Major H. J. Bensted, M.C., R.A.M.C. in this connection.

A small outbreak of food poisoning occurred in Jhelum when 25 individuals were attacked, the symptoms appeared 5-6 hours after ingestion of the evening meal. The disability was slight, and within 24 hours all had returned to duty. Examination of suspected food stuffs, stomach contents and faeces of the patients were all negative to organisms of the Salmonella group. Twenty days later samples of blood were taken from 19 of the cases. Fifteen out of the nineteen sera had appreciable titres of "O" agglutination for IV-5 group (Kauffman). The sera were next tested against specific H. suspensions of the various members of this IV-5 group. A certain number showed agglutinins for type *paratyphosum B* and type *stanley*, but the whole 15 sera agglutinated type *reading* in appreciable titres, the highest being 750. Five sera did not appear to contain any specific " H " agglutinins for Salmonella type typhosum (or stanley) or type *paratyphosum B.* yet they reacted with " H " suspensions of type *binns.* Absorption experiments with these five sera showed that Salmonella type *reading* was able in each case to remove all the agglutinins " O " and " H " (specific and group) of the Kauffman IV-5 group. Owing to the fact that a specific organism was not isolated from any specimen the investigation was not complete, but it was considered probable that the outbreak was due to an intoxication associated with an infection of some food stuffs with *Salmonella* type *reading.*

Typhus group of fevers.—5,360 c.cs. of concentrated suspensions of B. proteus OX 2, OX 19, OXK, OXM were supplied by the Enteric Laboratory, Kasauli, to military laboratories in 1936.

2,101 series of agglutination tests were carried out in suspected cases the results of which have already been quoted in this report, and the difficulty in accepting any particular titre as diagnostic unless high has also been noted. In view of the power of sera, in which raised agglutinin titres to the proteus OX group are present, in fixing complement, Wassermann tests were carried out in the District Laboratory, Rawalpindi, on the sera of 200 healthy and nontyphus pyrexia cases as controls.

Positive results were obtained once in a case of malaria, twice in tubercular infections and once in a case of typhoid, where the agglutinins for Proteus OXK rose from nil to 300. In this connection the following details are of interest. In the Command Laboratory, Poona, a small series of doubtful and false positive Wassermann results on gonorrhœa cases showing no clinical evidence of syphilis was obtained, which contrasted markedly with the clear cut negatives in such cases from other hospitals. It was found on investigation that these cases had received T.A.B. vaccine intravenously as protein shock treatment. Similar results were obtained in this laboratory from " climatic Bubo " cases receiving intravenous T. A. B. injections in 1935.

In the District Laboratory, Rawalpindi, an unusual number of bacilli resembling B. fæcalis alkaligenes were isolated from the blood of cases ultimately diagnosed as " typhus group ".

An organism was isolated in the District Laboratory, Ranikhet, from the urine of a case of typhus fever, and was found to be identical in its H antigen with B. proteus OX 2, OX 19, and OXK. But the " O " antigen differed from that of any of the classical types. The patients serum agglutinated B. proteus

OX 2 to a titre of 1 in 1350, but showed no agglutination against the homologous organism. It was considered therefore that the organism was not concerned with the patient's illness.

The difference in the end point of agglutination titre between Dreyer's technique and the technique of Felix referred to as regards T. O. agglutination applies with equal force to the proteus OX group and comparative tests are also being carried out in this connection. An investigation into typhus fevers in the Bhim Tal area, Kumaon was carried out by Captain B. Blewitt, R.A.M.C., and his report will in due course appear in the R.A.M.C. Journal.

Diphtheria.—209 positive cultures of C. diptheriæ were obtained from throat swabs of 3,834 individuals, and 48 positive cultures from 2,431 contacts. The work of Major H. J. Bensted, M.C., R.A.M.C. in connection with an outbreak of diptheria exhibiting cutaneous and faucial lesions which occurred in the winter of 1935-36 was referred to in the 1935 report, and has been published in the R.A.M.C., Journal of November 1936. A similar case to the above occurred in a patient from another regiment in Calcutta in 1936, C. diphtheriæ of moderate virulence being isolated from the throat, and from an indolent ulcer on the knee of several weeks' duration.

Two nursing orderlies who attended this case both became temporary carriers. In the Rawalpindi District of 58 virulent C. diphtheriæ strains only three have proved to be of the *Gravis* type. The remainder having the characters of C. *diphtheriæ mitis*. There was a small epidemic among the families in Dalhousie in which the organism was isolated in 14 cases, all of which were of the *intermediate* type.

As the result of six cases among children attending schools in Kirkee the noses and throats of all school children were swabbed. Diphtheroids were grown from 14 of which 8 proved to be virulent C. diphtheriæ. All children of 3 years and upwards (126) were immunised with with 1 c.c. T. A. F., three injections at 10 day intervals.

Virulence tests during the year totalled 320.

Culture of malaria parasites.—It was thought possible that owing to the simplicity of technique it might be feasible for clinical side-rooms in hospitals to make use of this with a view to reducing the percentage of "clinical" malaria cases diagnosed.

The District Laboratory, Peshawar and Rawalpindi carried out comparative tests of culture and microscope diagnosis. In Peshawar 132 cases were examined of which 89 had been diagnosed in the hospital side-rooms by slide examinations, and 21 as clinical malaria, no parasites having been seen. Thick drops were taken from each case at the time of culture. All 89 positive cases except one yielded positive cultures.

Of the clinical malaria cases 52·4% yielded a positive blood culture, but these apparently good results were negatived by the fact that when microscopic examination was made of the thick drops in 10 out of the 11 cases were parasites discovered. In only 1 case was a positive culture obtained in which parasites could not be demonstrated by the thick drop method.

In Rawalpindi results were slightly more encouraging. Culture was successful on every occasion in those cases in which parasites, no matter how few, had been demonstrated in film, and cultures were positive in cases in which parasites had only been discovered in later preparations.

On the other hand parasites were never cultivated from the blood of patients when the persistent and prolonged examination of direct blood films had failed to show Plasmodia.

The cultivation of P. falciparum was of interest in that in several cases large numbers of gametocytes were found at the end of 24 hours incubation in blood where the original film had only shown typical asexual trophozoites. The method employed in both laboratories was Thomson's modification of Bass and John's method.

On the whole therefore it is considered that cultivation methods would not justify their use in hospital clinical side-rooms. The tests were however of some value, in that they emphasise the necessity for thick blood examinations as well as thin and also for repeated and careful microscopic examinations in cases negative on first examination prior to the commencement of specific treatment.

Blood sedimentation tests.—Apparatus for this purpose is now available in many of the laboratories, but the demands for the test vary with the interest taken in it by the specialist concerned. In Lahore sedimentation tests were carried out at the request of the latter on 62 cases of various diseases. The results showed that although sedimentation is rapid in proved tubercular cases, it was equally so in other diseases and could only therefore be regarded as a non-specific reaction. It is thought however that this condemnation is somewhat sweeping and that military laboratory workers in India might well increase their knowledge as to the utility of the test, not necessarily in diagnosis, but rather to indicate progress during disease.

Biochemical examinations, etc.—These, as in former years, were restricted apart from the usual kidney efficiency tests to blood urea tests 295, blood sugar tests 268, Vanden Berg's reaction 243, and fractional test meals 458. The numbers of the two former tests has nearly doubled those carried out in 1935. 290 chemical and microscopic examinations of cerebrospinal fluid were carried out, and 238 cultures were taken for meningococci, Pea flour Trypagar being the medium of choice.

Major D. N. Chakravarti, I.M.S. in Allahabad carried out during the year very complete chemical investigations on the blood serum of heat exhaustion, and heat stroke cases. The investigations have been extended over the year 1937 also. His preliminary results are being published in the Indian Journal of Medical Research.

Wassermann tests.—The number of tests carried out in the five laboratories which carry out these tests is very similar to those recorded in 1935. In District Laboratory, Rawalpindi, over 7,000 tests were carried out during the year. Both amboceptor and antigen are now prepared in this laboratory. Kahn antigen purchased in the open market did not give good results, and is now being prepared from Bacto. Beef heart. In Command Laboratory, Poona, all reagents for both Wassermann and Kahn tests are prepared in the laboratory. Preparation of suitable amboceptor for the Wassermann test has been the most troublesome as for some reason it has been difficult to maintain this reagent at a suitable titre. Eighteen months, stock is kept in the laboratory of all reagents.

Considering the long distances and hot weather during which specimens are sent to these laboratories, the number received hæmolysed or with capsules broken is few, *e.g.*, of 6,135 posted to Rawalpindi 1·8% were hæmolysed and 0·5 broken; of 4,241 posted to Poona 3·4% were hæmolysed, and only 0·09% broken.

Othre examinations.—These as always were very varied, but the following comprise certain of the more common examinations in the military laboratories —Bacteriological examinations of water 2,334, Preparation of autogenous vaccines 645, Bacteriological examination of pathological fluids 537, scrapings for Leishmaniasis 997, Dark ground examinations of scrapings from venereal sores for Treponema Pallide 1,079, examination of urethral smears for Gonococci 667, chemical examinations of milk 257. Sections were cut and reported on from 699 cases, which included the usual percentage of cysts and tumours of various kinds. One hundred and fifty examinations were carried out on brains of animals suspected of rabies, mainly dogs, but a few horses, buffaloes and jackals were also examined. Fifty-eight snakes were sent to laboratories for identification. There were 73 post-mortems carried out by D. A. Ds. P. or medical officers in-charge, Brigade Laboratories, during the year. Blood typing for purposes of blood transfusion was carried out in most laboratories; in all 899 donors were grouped. Animal inoculation is employed mainly for virulence tests on diphtheroids, now compulsory for all such isolations, and for diagnosis in suspected tubercular disease. Three hundred and twenty virulence tests for diphtheriæ, were carried out, the majority being by the intradermal method.

Women and Children (British Other Ranks).

27. A total of 1,369 women or 3,37·6 per 1,000 of the strength were admitted to hospital compared with 1,305 or 312·4 per 1,000 in 1935.

The principal causes of admission to hospital were:—

Abortion	121	Cellulitis	47
Malaria	82	Bronchitis	39
Tonsillitis	81	Diarrhœa	36
Dysentery	48	Constipation	28
Appendicitis	47	Gastritis	24

The number of women treated as out-patients was 2,929 or 722·3 per 1,000 of the strength.

In addition, 782 women were admitted to hospital for confinement. Three confinement cases developed puerperal septicæmia (0·38%), which considering the conditions in India as compared with those prevailing in the United Kingdom, is considered to be a low figure. Two of these cases died. Prontosil preparations are now in use in all family hospitals, and it is hoped will reduce the above figures still further in future years.

The total number of deaths among women was 14.

There were 2,077 children or 335·4 per 1,000 of the strength admitted to hospital compared with 2,180 or 334·3 in 1935.

The principal causes of admission to hospital were:—

Tonsillitis (including inflammation and hypertrophy)	348	Enteritis	42
Dysentery	195	Common cold	39
Bronchitis	145	Tænia saginata	37
Diarrhœa	125	Phimosis	35
Malaria	89	Fractures	33
Cellulitis	82	Inanition	27
Constipation	58	Jaundice	27
Diphtheria	58	Lymphadenitis	27
Pneumonia	46	Conjunctivitis	24
Chicken-pox	44	Measles	21
Influenza	43		

A total of 4,690 or 757·4 per 1,000 of the strength were treated as out-patients.

There were 83 deaths giving a ratio of 13·40 per 1,000.

The chief causes were:—

Dysentery	16	Premature birth	6
Pneumonia	10	Inanition	5
Enteritis	10	Asphyxia livida	5
Gastritis	6	Convulsions	4

Dysentery, diarrhœa and enteritis accounted for 58·5 admissions to hospital, per 1,000 of the strength and 17·4 per cent. of the total admissions.

The deaths resulting from these three diseases amounted to 34 (5·49 per 1,000) or 41·0 per cent of the total deaths from all causes.

The majority of these cases are due to infections with B. sonne or B. flexner and treatment is mainly carried out on methods recommended by Colonel V. B. Green Armytage. Many of the cases are not brought to the notice of medical officers by their parents until the second or third day of illness. If all cases could be seen and treated directly after onset it is certain that the high death rate could be much reduced. The remarks made as regards source of infection for British troops apply with even greater force as regards families. All are advised to obtain milk from only government dairy sources, and to boil milk from other sources. Owing to the cheaper rate of milk from bazaar milk shops efforts in this direction are not always successful. Milk and flies are probably the main source of infection.

X-ray Examinations.

28. *Summary of X-ray Examinations for the year 1936.*

No. of patients examined	British		15,336
	Indian		8,571
	Civilian		1,661
No. and nature of examinations carried out.	Bones and Joints	Injury	15,277
		Disease	2,175
	Sinuses		789
	Teeth		1,110
	Lungs		2,634
	Heart		107
	Gastro intestinal		594
	Liver and gall bladder		360
	Urinary tract		895
	Genital tract		118
	Miscellaneous		506
	Foreign body		48
	Pregnancy		34
Cases in which a contrast medium was used and nature of medium.	Barium		631
	Shadacol		128
	Liro-selectan B and lipiodol		134
Miscellaneous information (Monthly and Annual)	No. of ordinary films used		34,990
	No. of dental films		3,943
	No. of exposures		49,879
	No. of prints		43
	No. of screen examinations		675
X-ray papers in lieu of Films			128

TABLE 23.

Surgical Operations.

29. *Summary of operations carried out by Surgical Specialists during 1936. (British).*

Operations.	Officers.	British Other Ranks.	All others.	Recovered.	Invalided.	Died.	Remarks.
Nervous system.							
Suture of ulnar nerve	..	1	..	1	..	..	
Anterior transposition ulnar nerve	..	1	..	1	..	..	
Median and ulnar neurolysis	..	1	..	1	..	..	
Injection of saline sciatic nerve	..	4	..	4	..	..	
Head and neck.							
Trephine	..	3	..	1	..	2	
Subtemporal exploration	..	1	..	..	..	1	
Eye.							
Enucleation eye	..	2	..	2	..	..	
F. B.	..	5	..	5	..	..	
Excision lacrymal sac.	..	1	..	1	..	..	
Penetrating wound	..	1	..	1	..	..	
Cataract	..	..	1	1	..	..	
Panophthalmitis eviceration	..	1	..	1	..	..	
Iridectomy	..	1	..	1	..	..	
Others	..	2	1	3	..	..	
Ear, Nose and Throat.							
Nasal cautery	3	..	..	3	..	..	
Tonsillectomy	10	85	72	167	..	..	
Frontal sinus (Howrath)	..	1	..	1	..	..	
Retention cyst mouth-excision	..	..	1	1	..	..	
Mastoidectomy	1	8	1	7	2	1	
Myringotomy	1	2	..	3	..	..	1 Remaining.
Polypus	..	2	..	1	..	..	
Submucus resection	..	16	..	16	..	..	
Removal of salivary calculus	..	1	..	1	..	..	
Maxillary antrum	1	3	..	4	..	..	
Deflected septum	..	2	..	2	..	..	
Foreign Body in ear	..	..	1	1	..	..	
Removal of glands of neck	..	1	..	1	..	..	
Block dissection neck.	..	..	1	1	..	..	
Others	2	9	1	12	..	..	
Circulatory and blood forming organs.							
Varicose veins	..	27	1	28	..	..	
Varicose veins injection	4	35	12	51	..	..	
Varicose veins excision	..	2	..	2	..	..	
Ligature saphenous (vein)	..	1	..	1	..	..	
Blood transfusion	..	3	4	6	..	1	
Injection of saline	1	..	..	1	..	..	
Others	1	3	2	6	..	..	

Operations.	Officers.	British Other Ranks.	All others.	Recovered.	Invalided.	Died.	Remarks.
Lymphatic system.							
Lymphadenitis	..	12	..	12	..	..	
Tropical bubo, excision	..	1	..	1	..	..	
Glands, excision	1	5	1	7	..	..	
Glands, incision	..	1	..	1	..	..	
Tubercular glands, excision	..	1	1	2	..	..	
Calculus submaxillary duct	..	1	..	1	..	..	
Lymphatic system	..	10	..	10	..	..	
Supp. Lymphadenitis groin excised (Venereal—Ducrey).	..	1	..	1	..	..	
Breast.							
Cystadenoma breast—excision	..	2	..	2	..	..	
Amputation	..	2	1	3	..	..	1 case—adolescent enlargement, unresponded to conservative treatment.
Mastitis	..	3	4	7	..	..	
Fibroma breast	..	1	..	1	..	..	
Respiratory.							
Empyema	..	6	..	4	1	1	
Aspiration of Pleural effusion	..	1	..	1	..	..	
Exploration of G. S. W. of chest	..	1	..	1	..	..	
Secondary suture of G. S. W.—thorax.	..	1	..	1	..	..	
Intratracheal lipiadol	..	1	..	1	..	..	
Excision of gynæcomastia	..	2	..	2	..	..	
Operations on the chest :—							
Rib resection	..	2	..	2	..	..	
Aspirations	..	1	..	1	..	..	
Teeth and gums.							
Teeth extraction	4	155	16	175	..	..	
Alveolar abscess incision	..	1	..	1	..	..	
Digestive.							
Appendicectomy	40	141	167	345	1	2	
Liver abscess	1	3	..	3	1	..	
Hernia	8	85	7	100	..	..	
Cholecystectomy	1	..	3	2	..	2	
Cholecystotomy	..	1	..	1	..	..	
Laparotomy	2	16	5	16	..	7	
Retroperitonial abscess	..	1	..	1	..	..	
Hæmorrhoids	12	89	25	126	..	..	
Fissure in ano.	1	12	1	14	..	..	
Fistula in ano.	5	3	3	11	..	..	
Ischiorectal abscess	..	9	..	9	..	..	
Pelvic abscess	..	1	1	2	..	..	

Operations.	Officers.	British Other Ranks.	All others.	Recovered.	Invalided.	Died.	Remarks.
Digestive—contd.							
Prolapse	..	2	1	3	..	..	
Gastrojejunostomy	..	1	..	..	1	..	
Jejunostomy	..	1	..	1	..	..	
Ileostomy	..	1	..	1	..	..	
Colectomy	..	1	..	1	..	..	
Colostomy	..	1	..	1	..	..	
Splenectomy	..	1	..	..	..	1	
Intestinal obstruction	..	5	..	3	..	1	1 still in hospital.
T. B. peritonitis	..	..	1	..	1	..	
T. B. glands	..	1	..	1	..	..	
Hæmatoma	..	3	..	3	..	..	
Enterectomy	..	1	..	1	..	..	
Acute pancreatitis	..	1	..	1	..	..	
Volvulus	..	1	..	1	..	..	
Others	7	53	12	68	1	3	
Generative (Male).							
Undescended testicle	..	1	..	..	..	..	Still in hospital.
Varicocele	1	45	1	47	..	..	
Circumcision	1	51	38	90	..	..	
Phimosis	..	16	4	20	..	..	
Biopsy	..	1	..	1	..	..	
Passage of bougies	2	..	..	2	..	..	
Hydrocele	2	21	2	25	..	..	
Orchidectomy	..	3	..	3	..	..	
Urethral stricture, dilatation	1	..	2	3	..	..	
Acute epididymitis, incision	..	1	..	1	..	..	
Orchidopexy	..	1	..	1	..	..	
Spermatocele	..	1	..	1	..	..	
Carcinoma prostate and prostatectomy.	..	..	1	..	..	1	
Injection into vasdeferense	..	1	..	1	..	..	
Others	..	8	8	16	..	..	
Generative (female).							
Subtotal hysterectomy	..	..	1	1	..	..	
Cæsarian section	..	..	4	4	..	..	
Cystocele	..	..	1	1	..	..	
Hysterectomy	..	..	1	..	..	1	Anaesthetic death on table.
Ectopic gestation	..	..	3	3	..	..	
Uterine fibroid (Gravid uterus)—excision.	..	..	1	1	..	..	
Salpingectomy	..	..	1	1	..	..	
Dilatation and curettage	..	..	15	15	..	..	
Ventrosuspension	..	..	4	4	..	..	

Operations.	Officers.	British other Ranks.	All Others.	Recovered.	Invalided.	Died.	Remarks.
Generative (female)—contd.							
Ovariotomy	..	..	1	1	..	..	
Prolapse ovary	..	..	2	2	..	..	
Sterilization	..	..	1	1	..	..	
Dysmenorrhœa	..	..	1	1	..	..	
Salpingitis	..	..	2	2	..	..	
Uterine endometritis D. & C.	..	..	1	1	..	..	
Uterine ventro fixation	..	..	1	1	..	..	
Fibroid (vaginal)	..	..	1	1	..	..	
Cautery of cervix	..	..	3	3	..	..	
Pyosalpinx	..	..	1	1	..	..	
Bones, joints, muscles, fasciæ and tendons.							
Fractures, manipulated	19	178	33	224	4	2	
„ plated or wired	..	12	1	11	..	1	1 Remaining.
„ others	14	115	11	137	3	..	
Osteomyelitis	..	13	1	12	1	1	
Osteochondritis	2	1	..	2	1	..	
Osteoclasis	..	2	..	2	..	..	
Sequestrectomy	1	6	1	8	..	..	
Peripatellar bursitis knee	..	1	..	1	..	..	
Removal of bone plates	..	1	..	1	..	..	
Passive movement (inc. manipulation).	2	10	..	12	..	..	
Myositis ossificans, excision of bony mass.	..	1	..	1	..	..	
Removal of exostosis, matacarpal	..	1	..	1	..	..	
Autrostomy	..	..	2	2	..	..	
Exostosis, subinqual right great toe.	..	1	..	1	..	..	
Exostosis	1	6	..	7	..	..	
Dislocation	1	28	5	34	..	..	
Hammer-toe	..	24	1	25	..	..	
F. B. removal	..	9	1	10	..	..	
Manipulations joints	3	74	11	87	1	..	
Semilunar cartilage	1	59	..	60	..	..	
Intra articular cartilage	..	4	..	4	..	..	
Arthrotomy	..	30	..	30	..	..	
Maniscectomy	1	45	2	48	..	..	
Hallux Valgus	..	3	2	5	..	..	
Bursitis	..	14	..	14	..	..	
Disarticulation knee	..	1	..	1	..	..	
Tenotomy	..	2	..	2	..	..	
Suture tendon	..	4	..	4	..	..	
Ganglion	1	9	..	10	..	..	
Hernia of muscle	..	1	..	1	..	..	

Operations.	Officers.	British Other Ranks.	All others.	Recovered.	Invalided.	Died.	Remarks.
Bones, joints, muscles, fasciae and tendons—contd.							
Dupuytren contracture	1	1	..	2	..	..	
Lengthening, tendons	..	..	1	1	..	..	
Excision of joint	..	1	..	1	..	..	
Osteotomy	..	1	1	2	..	..	
Subluxation Sacro-iliac	1	4	1	6	..	..	
Subluxation sup. Tib-Fibula	..	1	..	1	..	..	
Pes cavus—Steiners operation	..	1	..	..	1	..	
Anthrotomy and meniscotomy	..	4	..	4	..	..	
Repair of wounds	..	3	..	3	..	..	
Compound fracture of skull with laceration of brain.	..	..	1	..	..	1	
Osteoarthritis	..	2	..	2	..	..	
Flat feet	..	4	..	4	..	..	
Dislocations, reductions and manipulations.	..	4	..	4	..	..	
Sprains, manipulations	..	2	..	2	..	..	
Amputations.							
Toe	..	9	..	9	..	..	
Finger	..	9	..	9	..	..	
Forearm	..	1	..	1	..	..	
Thigh	..	2	..	1	1	..	
Leg	..	1	..	..	..	1	
Skin and subcutaneous tissues.							
I. A. T.	19	279	22	316	..	2	2 Remaining.
Onychia	..	9	..	9	..	..	
Keloid	..	..	1	1	..	..	
Primary suture	..	1	..	1	..	..	
Secondary suture	..	1	..	1	..	..	
Finger nail excision	..	1	..	1	..	..	
Ingrowing toe nails	..	70	..	70	..	..	
Avulsion of nails	4	39	2	44	..	..	1 Remaining.
Plastic operations	1	2	2	5	..	..	
Excision of scar	1	2	..	3	..	..	
Warts	3	4	..	7	..	..	
Ligature of angular vein for carbuncle.	..	1	..	1	..	..	
Warts and scar tissue	..	2	1	3	..	..	
Corns	..	4	..	4	..	..	
Nævus	..	3	..	3	..	..	
Septic phimosis	..	1	..	1	..	..	
Boil in ear	..	1	..	1	..		
Rodent ulcer	1	..	..	1	..	..	

Operations.	Officers.	British Other Ranks.	All others.	Recovered.	Invalided.	Died.	Remarks.
Skin and subcutaneous tissues—contd.							
Papilloma	4	16	2	22	..	..	
Abscesses	22	189	33	224	..	..	
Onychogryphosis	..	1	..	1	..	..	
Fibroma	1	1	2	4	..	..	
Papillomatous growth above anus	..	1	..	1	..	..	
Cutaneous leishmaniasis	..	70	1	71	..	..	
Axillary adenitis	..	1	..	1	..	..	
Hair lip repair	..	..	1	1	..	..	
Skin grafting	..	2	..	2	..	..	
Rectal polypus	..	3	1	4	..	..	
Urinary.							
Pyonephrosis	..	..	1	1	..	..	
Hydronephrosis	..	2	..	2	..	..	
Nephropylolithotomy	..	1	..	1	..	..	
Perinephric abscess	..	2	..	2	..	..	
Nephrectomy	..	2	..	1	..	1	
Nephrotomy	..	..	1	1	..	..	
Uretero-lithotomy	..	1	..	1	..	..	
Cystoscopy	8	41	3	51	1	..	
Cystoscopy and pyelography	..	4	..	4	..	..	
Renal calculus	..	1	..	1	..	..	
Ureteral catheterisation	..	1	..	1	..	..	
Ureteral calculi	..	3	..	3	..	..	
Vesical calculus	..	..	1	1	..	..	
Injuries.							
Wounds	..	4	..	4	..	..	
G. S. Wounds	..	3	..	2	..	1	
Wounds and lacerations	2	15	4	21	..	..	
Ligaturing	1	..	1	2	..	..	
Suture of wounds	1	4	..	5	..	..	
Cleaning and repairs	3	13	3	18	1	..	
Cysts and tumours.							
Excision of sebaceous cysts	3	26	4	33	..	..	
Sebaceous	11	95	6	112	..	..	
Angioma of face	..	1	..	1	..	..	
Dental	..	..	1	1	..	..	
Ovarian	..	..	4	4	..	..	
Dermoid excision	..	3	..	3	..	..	
Dermoid	2	2	..	3	..	* 1	*Syncope
Tumours	..	4	..	4	..	..	under an-
Tuberculous	..	..	2	2	..	..	aesthetic.

Operations.	Officers.	British Other Ranks.	All others.	Recovered.	Invalided.	Died.	Remarks.
Cysts and tumours—contd.							
Retention parotid	..	1	..	1	..	..	
Baku's cyst	..	1	..	1	..	..	
Cysts occupational	..	1	..	1	..	..	
Tumours and cysts—removal	..	4	..	4	..	..	
Lipoma	3	3	..	6	..	..	
Salivary glands, cyst, aspiration	..	1	..	1	..	..	
Excision of angioma	..	1	..	1	..	..	
Excision of fibrous cyst	..	..	1	1	..	..	
Excision of cyst of epididymitis	..	..	1	1	..	..	
Neoplasm, excision	1	2	..	3	..	..	
Condylomata	..	1	..	1	..	..	
Sarcoma of bowel (Recurring examination).	1	..	..	..	1	..	
Diffuse lipoma	..	..	1	1	..	..	
Parasites.							
Cysticercosis, removal of cyst	..	1	..	1	..	..	
Miscellaneous.							
Foreign body removed	2	18	3	23	..	..	
Minor operations	..	59	..	59	..	..	
Pv. examinations	..	..	1	1	..	..	
Lumbar puncture	..	19	..	19	..	..	
Burns and scalds	..	3	..	3	..	..	
Arrest of secondary hæmorrhage scalp.	..	1	..	1	..	..	
Paracentesis, fontanelle for hydrocaphalus.	..	..	1	1	..	..	
Contusion extensor muscles leg.	..	..	1	1	..	..	
Tracheotomy	..	..	1	..	..	1	
Ligature of cut artery	..	1	..	1	..	..	
Incision and drainage	..	1	..	1	..	..	
Adenoma thyroid	..	..	1	1	..	..	
Others	..	16	1	16	..	1	
TOTAL	255	2,791	634	3,613	23	37	

30. Anaesthetics.

TABLE 24.

Chloroform	52
Chloroform and ether	757
Chloroform and ether and oxygen	5
Ether	130
Ether and oxygen	97
Ethyl chloride general	45
Ethyl chloride local	37
Ethyl chloride and ether	82
Ethyl chloride, chloroform and ether	32
Nitrous oxide	868
Nitrous oxide, and oxygen	5
Nitrous oxide, oxygen and chloroform	1
Nitrous oxide, oxygen and ether	476
Spinal	129
Local	588
Percaine	88
Percaine, chloroform and ether	1
Stovaine	1
Amylocaine	32
Planocaine	5
Beta Eucain 2½%	15
Evipan	128
Evipan and ether	21
TOTAL	3,595

SECTION II.

ON THE HEALTH OF THE INDIAN ARMY FOR THE YEAR 1936.

(From Director, Medical Services in India.)

General.

31. TABLE A.

	Average strength.	Admissions. No.	Admissions. Ratio per 1,000.	Deaths. No.	Deaths. Ratio per 1,000.	Invalids sent to United Kingdom. No.	Invalids sent to United Kingdom. Ratio per 1,000.	Invalids discharged in India. No.	Invalids discharged in India. Ratio per 1,000.	Average constantly sick. No.	Average constantly sick. Ratio per 1,000.
Officers	2,059	750	364·3	9	4·37	11	5·34	...	...	23·89	11·60
Indian Ranks	116,528	49,703	426·5	252	2·16	...	...	643	5·52	1,798·00	15·43
Followers	26,545	7,410	279·1	85	3·20	...	...	89	3·35	259·10	9·76
Others*	...	1,666	...	27	...	...	...	79	...	...	...

The health statistics of officers and Indian ranks for the quinquennial periods 1925-29, 1930-34 with those for 1935, and 1936 are given separately in the following table for purposes of comparison.

TABLE B.

Period.	Ratio per 1,000. Admissions. King's Commissioned officers.	Admissions. Indian ranks.	Invalids. King's Commissioned officers.	Invalids. Indian ranks.	Deaths. King's Commissioned officers.	Deaths. Indian ranks.
1925-29	498·0	385·6	5·22	10·8	4·74	3·48
1930-34	336·7	453·3	12·47	6·55	5·37	2·63
1935	346·8	422·7	6·82	5·54	7·31	2·15
1936	364·3	426·5	5·34	5·52	4·37	2·16

Officers.

32. The admission rate of officers sick in hospital for 1936 is 346·3 per 1,000 of strength as compared with 346·8 in 1935.

*Includes Reservists, Indian Territorial Forces, Royal Indian Marine, Indian States Forces, R. A F., Civilians and Pensioners.

The principal causes of sickness were:—

TABLE C.

Diseases.	Actuals.	Ratio per 1,000.	Increase or decrease as compared with 1935. Increase.	Decrease.
Digestive diseases other than tonsillitis, appendicitis and diarrhœa	107	52·0	6·7	..
Local injuries	91	44·2	..	6·5
Malaria	71	34·5	..	5·4
Minor septic diseases	53	25·7	..	1·6
Tonsillitis	51	24·8	9·2	..
Sandfly fever	49	23·8	14·1	..
Dysentery	41	19·9	2·4	..
Respiratory diseases	29	14·1	..	0·5
Diarrhoea	28	13·6	1·4	..
Appendicitis	24	11·7	..	0·5
Ear and nose	22	10·7	..	5·4
Diseases of bones, joints, muscles, fasciae and bursae	18	8·7	..	5·4
Urinary diseases	17	8·3	3·4	..
Jaundice catarrhal	16	7·8	..	..
Common cold	15	7·3	4·9	..

There were 9 deaths of which 3 were due to injuries, and 6 to other diseases (Poliomyelitis, Syncope, Thrombosis of artery, Pneumonia lobär, appendicitis, Cholescystitis 1 each).

Soldiers.

33. 49,703 or 426·5 per 1,000 of the strength, were admitted to hospital, compared with 422·7 in 1935. There is thus an increase of 3·8 per 1,000 compared with the 1935 figures.

The principal causes of admissions to hospital were :—

TABLE D.

Diseases.	Actuals.	Ratio per 1,000.	Increase or decrease as compared with 1935. Increase.	Decrease.
Malaria	14,340	123·1	..	2·8
Local injuries	6,125	52·6	..	0·5
Minor septic diseases	3,893	33·4	..	1·9
Pharyngitis	2,329	20·6	4·1	..
Bronchitis	1,315	11·3	..	..
Dysentery	1,277	11·0	..	1·2
Common cold	1,241	10·6	4·8	..
Sandfly fever	1,236	10·6	3·1	..
Venereal diseases	1,142	9·8	..	0·3
Scabies	894	7·7	..	1·9
Influenza	851	7·3	1·9	..
Diarrhœa	726	6·2	0·6	..
Conjunctivitis	725	6·2	..	0·2
Tonsillitis	690	5·9	0·7	..
Ankylostomiasis	638	5·5	..	1·7
Pneumonia (lobar and lobular)	624	5·4	0·5	..
Mumps	599	5·1	..	1·7
Indigestion	427	3·7	..	..
Constipation	398	3·4	0·2	..
Ring worm	354	3·0	0·6	..
Dermatitis	329	2·8	0·2	..
Synovitis	323	2·8	..	0·3
Coryza	321	2·8	..	0·1
Otitis media	307	2·6	..	0·1
Rhinitis	307	2·6	0·2	..
Dengue	297	2·5	..	0·9
Myalgia	288	2·5	..	..
Eczema	279	2·4	0·4	..
Epidemic dropsy	265	2·3	2·3	..
Jaundice	252	2·2	..	0·3
Trachoma	230	2·0	..	..
Pleurisy	217	1·9	..	..
Pulmonary tuberculosis	203	1·7	..	0·2
Appendicitis	191	1·6	..	..
Piles	189	1·6	0·1	..
Oriental sore	172	1·5	0·9	..
Dracontiasis	171	1·5	..	0·2
Keratitis ulcerative	166	1·4	0·2	..
Measles	156	1·3	..	0·9
Colic	147	1·3	0·1	..
Gastritis	146	1·3	0·4	..
Ascariasis	144	1·2	0·1	..
Anaemia secondary	141	1·2	..	..
Renal colic	134	1·1	0·2	..
Sciatica	128	1·1	..	..
Lumbago	122	1·0	0·1	..
Urticaria	117	1·0	0·2	..

The death rate shows an increase of 0·01 per 1,000 from 2·15 in 1935 to 2·16 in 1936.

The main causes of deaths were :—

TABLE E.

Diseases.	Actuals.	Ratio per 1,000.	Increase or decrease as compared with 1935. Increase.	Decrease.
Pneumonia (Lobar and lobular)	71	0·61	0·10	..
Local injuries	41	0·35	0·02	..
Pulmonary tuberculosis	15	0·13	..	..
Circulatory diseases	15	0·13	0·01	..
Digestive diseases	15	0·13	0·02	..
General injuries	14	0·12	..	0·09
Nervous diseases	10	0·09	0·02	..
Malaria	8	0·07	..	0·01
Septicaemia	6	0·05	0·02	..
Enteric group of fevers	5	0·04	..	0·07
Meningococcal infection	4	0·03	..	0·03
Tuberculosis (other than pulmonary)	3	0·03	..	0·03
Poisons	3	0·03	..	..

Invalids.—There were 643 or 5·52 per 1,000 invalids discharged during the year, this is 0·02 per 1,000 less than in 1935.

TABLE F.

Principal causes of invaliding.

Diseases.	Actuals.	Ratio per 1,000.	Increase or decrease as compared with 1935. Increase.	Decrease.
Pulmonary tuberculosis	193	1·66	..	..
Injuries	119	1·02	0·17	..
Diseases of bones, joints, muscles, fasciae and bursae	53	0·45	0·16	..
Diseases of the eye	42	0·36	0·04	..
Mental diseases	39	0·33	0·07	..
Diseases of the nervous system	33	0·28	..	0·06
Respiratory diseases	31	0·27	..	0·01
Circulatory diseases	21	0·18	..	0·05
Digestive diseases	18	0·16	..	0·06
Other tubercular diseases	15	0·13	..	0·08
Diseases of blood	15	0·13	0·04	..
Diseases of ear and nose	9	0·08	..	0·08
Diseases of urinary organs	8	0·07	..	0·01
Leprosy	7	0·06	..	0·05
Venereal diseases	4	0·03	..	0·03

The average number constantly sick in hospital was 1798·00 or 15·43 per 1,000 of the strength, compared with 15·71 in 1935.

The average sick time to each soldier was 5·65 days, and the average duration of each case 13·24 days; the corresponding figures were 5·73 and 13·56 in 1935.

156,537 men, or 1343·3 per 1,000 of the strength, were treated as out-patients compared with 1233·2 per 1,000 in 1935. The average daily number under treatment in barracks was 2271·82 or 19·50 per 1,000 compared with 17·35 per 1,000 in 1935.

The combined ratio constantly sick in hospital and under treatment as out-patients was 34·93 per 1,000 of the strength, compared with 33·06 in 1935.

The above represents a loss of 658,068 men days in hospital and 831,486 men days treated in barracks or a total loss of 1,489,554 men days in the year.

Table G on pages 48-49 shows admissions and death ratios per 1,000 of the strength for all causes and certain important diseases for stations with a strength of 2,000 and upwards compared with all-India.

The statistics as a whole show that the health of the Indian Army was very good.

Admissions to hospital for Indian ranks were 3·8 per 1,000 more than last year. The invaliding rate and the death rate are practically the same.

PRINCIPAL DISEASES AFFECTING THE INDIAN ARMY.

Cerebro-spinal Meningitis.

34. The incidence during the year was as follows:—

	Cases.	Deaths.	Case mortality per cent.
Indian Troops (Regular) . .	16	4	25
Followers	4	3	75
Pupils, K. G. R. I. M. School, Ajmer	..	..	..
	20	7	35

The seasonal and geographical distributions of the total Indian cases were:—

January—		*March*—		*August*—	
Jullundur .	2	Lahore .	1		
Lahore .	1	Jullundhur .	1	Rawalpindi .	1
Bareilly .	1	Razmak .	2		
		Jubbulpore .	1		
Total .	4	Total .	5	Total .	1
February—		*May*—		*November*—	
Kohat .	1	Jullundur .	1		
Quetta .	2	Lahore .	1	Dehra Dun .	1
		Quetta. .	1		
Total .	3	Total .	3	Total .	1

December—	
Sialkot	2
Bannu	1
Total .	3
GRAND TOTAL .	20

TABLE

Table showing admission and death ratios per 1,000 of the strength for all causes compared

Stations with *total* admission ratios, all causes, higher than all-India.

Stations.		Wana.	Bannu.	Rawalpindi.	Dehra Dun.	Razmak.	Lahore.	Fort Sandeman.	Poona.	All India.
Strength		3,279	2,035	4,553	3,055	4,677	2,351	2,132	3,324	116,528
All causes	A.	680·1	608·4	472·7	469·7	444·9	441·5	435·7	433·8	426·5
	D.	2·13	2·95	2·42	2·95	2·99	2·98	0·94	0·30	2·16
	A.C. Sick.	19·95	18·77	19·17	20·85	19·48	12·05	10·23	15·22	15·43
Analysis of the above *total* admission rates.										
Malaria	A.	284·5	146·9	109·2	81·5	79·5	80·8	190·4	101·4	123·1
	D.	0·30	...	...	...	...	...	..	..	0·07
Sand-fly fever	A.	0·3	94·3	10·8	20·9	0·2	28·1	4·2	..	10.6
	D.	..	...	...	...	...	...	...	...	...
Enteric group	A.	..	0·5	0·4	2·3	0·8	1·3	0·5	0·9	0·7
	D.	..	..	0·22	...	..	...	...	..	0·04
Dysentery	A.	6·0	10·4	11·4	7·6	11·9	6·0	4·2	29·5	11·0
	D.	..	...	...	...	...	...	...	...	0·03
Diarrhœa	A.	4·0	23·1	16·9	5·9	7·3	11·5	8·4	7·5	6·2
	D.	...	...	...	...	...	...	..	...	..
Influenza	A.	59·2	9·8	2·9	2·6	8·8	13·2	..	20·2	7·3
	D.	0·30	..	..	..	..	..	...	...	0·01
Pneumonia lobar & lobular.	A.	7·3	10·8	6·6	5·9	4·9	7·7	6·1	3·0	5·4
	D.	..	1·47	0·22	0·98	1·71	..	0·47	0·30	0·61
Venereal diseases	A.	5·2	14·7	8·3	14·4	8·3	10·6	5·2	20·2	9·8
	D.	...	...	...	...	...	...	...	...	...
Minor septic diseases.	A.	25·6	40·8	39·5	56·0	34·4	40·4	34·2	39·1	33·4
	D.	...	...	...	...	...	...	...	...	...
Local injuries	A.	86·6	69·3	53·2	80·9	64·6	71·5	49·2	62·3	52·6
	D.	0·61	0·49	0·22	0·33	0.21	0·85	0·47	..	0·35
Heat-stroke	A.	..	..	..	..	..	..	..	..	0·0
	D.	..	..	..	..	..	..	..	..	0·01
Heat-exhaustion	A.	...	...	0·4	..	..	..	...	..	0·1
	D.	...	...	...	...	...	...	...	...	...
Ankylostomiasis	A.	6·1	2·9	9.2	10·5	3·2	2·6	1·9	4·5	5·5
	D.	...	...	...	...	...	...	...	...	...
Pulmonary tuberculosis.	A.	0·6	2·9	3·3	2·3	0·9	1·7	0·5	1·2	1·7
	D.	..	..	..	0·33	..	0·43	..	..	0·13

G

and certain important diseases for stations with a strength of 2,000 and upwards with all-India.

Stations with *total* admission ratios, all causes, lower than all-India.

Pesha-war.	Jubbul-pore.	Banga-lore.	Now-shera.	Kohat.	Quetta.	Jhelum.	Trimul-gherry.	Abbot-tabad.	Ambala.	Roor-kee.	Meerut.
5,773	2,414	2,641	2,791	4,043	4,954	2,357	3,027	3,877	2,439	2,402	2,349
433·4	408·5	405·9	402·0	392·0	376·1	373·4	366·7	361·1	330·5	321·0	291·2
2·42	0·83	2·65	2·15	2·47	2·42	2·12	1·32	4·90	0·82	2·91	2·13
13·50	14·31	22·26	14·46	13·80	19·47	9·45	15·45	11·23	15·81	10·08	14·58

Analysis of the above *total* admission rates.

168·2	103·5	42·4	116·1	155·1	99·7	204·1	28·4	85·6	90·2	125·3	77·9
...	...	...	...	0·25	...	...	...	...	...	0·42	...
47·5	...	...	8·2	13·1	1·0	1·7	3·3	...	11·1	..	...
...	...	...	...	...	...	...	...	...	...	...	..
0·4	...	0·8	0·8	0·2	0·8	...	2·3	0·3	...	0·8	0·4
..	...	...	...	...	0·20	...	0·66	...	...	...	...
19·7	14·9	10·7	6·4	18·0	9·6	12·7	22·4	2·1	8·3	...	19·5
0·17	...	...	...	...	...	...	...	...	...	...	...
3·3	3·3	1·9	7·2	11·9	4·4	1·3	3·6	9·0	0·8	3·3	0·4
...	...	...	...	...	...	...	...	...	...	...	...
0·3	29·4	19·7	4·3	...	3·4	...	5·0	...	2·5	1·2	...
...	...	...	...	...	...	...	...	...	...	...	...
6·9	2·1	3·8	4·7	4·5	5·7	6·4	1·7	8·3	7·4	6·2	8·9
0·52	0·41	0·76	0·36	0·74	0·20	0·85		2·58	...	1·67	0·85
6·9	5·4	13·6	7·9	6·4	2·0	3·4	4·6	6·2	7·4	8·3	16·2
...	...	...	...	...	...	...	...	...	...	...	...
31·0	45·2	43·2	28·3	26·5	15·7	21·2	28·1	36·6	32·4	33·3	17.9
...	...	...	...	...	...	...	...	...	...	...	...
33·6	58·4	93·9	46·9	33·6	39·4	27·2	83·3	50·6	48·8	42·9	38·7
0 35	...	...	0·72	0·25	1·21	0·85	0·33	0·52	...	...	0·43
...	...	...	...	0·2	...	0·4	...	...	...	...	...
...	...	...	...	...	...	0·42	...	...	...	...	...
...	...	...	2·1	...	...	2·1	...	...	0·4	...	...
0·2	...	...	...	...	...	...	...	...	...	...	...
1·9	3·3	3·0	2·5	2·2	26·0	6·8	18·2	16·8	4·9	...	2·6
...	...	...	...	...	...	...	...	...	...	...	...
1·0	0·8	...	2·5	2·7	1·8	2·5	1·0	2·3	0·8	1·2	0·4
0·17	...	...	0·36	0·25	0·20	...	...	0·77	...	...	0·43

The age incidence was chiefly between 18 and 20 years and at 26 years. Out of the 17 cases in Indian Regular units 3 were recruits.

Dengue.

35. 297 cases were admitted for this disease giving a ratio of 2·5 per 1,000 compared with 3·4 in 1935. The stations principally affected were :—

	Actuals.	Ratio per 1,000.
Madras	171	339·3
Mingaladon	48	59.5
Mandalay	32	43·9

Typhus Fever.

36. There were 48 cases among Indian ranks and the distribution and type are given in Section I—Page 15.

Except in Southern Command where cases occurred all the year round the seasonal incidence was chiefly during second half of the year.

This disease is dealt with in greater detail in the Section of the report on British Troops.

Sandfly Fever.

37. There were 1,236 cases in 1936 compared with 882 in 1935, thus giving ratios per 1,000 of 10·6 and 7·5 respectively.

The incidence was chiefly among the troops in Kohat District, Peshawar District, Waziristan District, Lahore District, Zhob (I) Bde. Area, Meerut District and Rawalpindi District with ratios per 1,000 of 78·0, 36·1, 18·8, 12·7, 10·3, 5·6 and 4·9 respectively.

Dysentery, Diarrhœa and Colitis.

38. TABLE I.

Years.	Dysentery.		Diarrhœa.		Colitis.		Total.	
	Actuals.	Ratio per 1,000.	Actuals.	Ratio per 1,000.	Actuals.	Ratio per 1,000.	Actuals.	Ratio per 1,000.
1933 . .	1,804	15·3	933	7.9	30	0·3	2,767	23·5
1934 . .	1,632	13·9	742	6·3	28	0·2	2,402	20·5
1935 . .	1,424	12·2	651	5·6	21	0·2	2,096	17·9
1936 . .	**1,277**	**11·0**	**726**	**6·2**	**39**	**0·3**	**2,042**	**17·5**

The admissions for different types of dysentery are given below and the percentage of each type remains very much the same as in 1935.

	Actual admissions.	Percentage.
Dysentery protozoal	75	5·87
Dysentery bacillary (proved bacteriologically)	652	51·06
Dysentery bacillary exudate (no dysentery bacilli isolated)	316	24·75
Dysentery clinical	234	18·32

Only 4 deaths occurred in the 1,277 dysentery cases, thus giving a case mortality of 0·31 per cent. In 1935 there were 2 deaths in 1,424 cases and a case mortality of 0·14 per cent. The distribution of dysentery by Commands is given below :—.

TABLE J.

	Dysentery. (Ratio per 1,000).			
	Amoebic.	Bacillary (bacteriologically proved).	Bacillary exudate.	Clinical.
Northern Command	0·5	4·6	2·3	2·3
Western Command	0·3	2·3	2·1	2·6
Eastern Command	0·5	6·1	3·0	1·7
Southern Command	0·7	10·0	3·2	1·0
Burma District	4·6	3·9	8·1	4·2

Enteric Group of Fevers.

39. These diseases are fully dealt with in the section of the report on British Troops where figures for Indian Troops also are given.

Among Indian Troops in 1936 the admission rate was 0·7 per 1,000 as compared with 1·4 per 1,000 in 1935, there being actually 88 less cases in 1936 than in 1935.

Out of the total of 78 cases there were 5 deaths representing a case mortality of 6·4 per cent. In 1935 there were 13 deaths in 166 cases giving a case mortality of 7·8 per cent.

The inoculation state of the troops is satisfactory, the figures for the last half yearly inoculation in October being :—

TABLE K.

	British officers.	Indian other ranks.	Followers.
Strength	2,162	121,402	24,645
Protected	2,050	120,080	24,492
Unprotected	112	1,322	153
Protected percentage	94·8	98·9	99·4

The relative incidence, deaths and case mortality among protected and unprotected I. O. Rs. were :—

TABLE L.

	Actuals.		Ratio per 1,000		Case mortality per cent.
	Cases.	Deaths.	Cases.	Deaths.	
Protected	68	4	0·57	0·03	5·88
Unprotected	10	1	7·56	0·76	10·00

Malaria.

40. There were 14,340 cases of malaria with 8 deaths in 1936 compared with 14,728 cases and 9 deaths in 1935. The ratios per 1,000 during the last five years were :—

TABLE M.

	1932.	1933.	1934.	1935.	1936.
Admissions . .	145·1	212·2	156·5	125·9	123·1
Deaths . . .	0·10	0·06	0·05	0·08	0·07
Invalids . .	0·07	0·05	0·06	0·03	..

The following table shows the incidence of the various types of malaria by Commands :—

TABLE N.

Commands & Independent Districts.		Admissions and Deaths. Actuals. B. T.	M. T.	Qtn.	Clin.	Ratio per 1,000. B. T.	M. T.	Qtn.	Clin.
Northern	A.	5,117	2,078	14	601	90·8	36·9	0·2	10·7
	D.	1	1	..	..	0·02	0·02	..	..
Western .	A.	1,244	259	6	79	100·0	20·7	0·5	6·3
	D.	1	..	..	..	0·08	..	..	..
Eastern .	A.	1,866	624	9	241	78·0	26·1	0·4	10·1
	D.	..	2	..	..	..	0·08	..	..
Southern.	A.	945	596	12	70	45·1	28·4	0·6	3·3
	D.	..	..	..	..	..	..	..	..
Burma .	A.	290	86	2	39	102·6	30·4	0·7	13·8
	D.	1	..	..	..	0·35	..	..	..
All India	A.	9,467	3,643	43	1,030	81·2	31·3	0·4	8·8
	D.	3	3	..	..	0·03	0·03	..	..

The stations with an average annual strength of over 1,000 in which malaria admissions exceeded 100 per 1,000 were :—

Loralai	289·2	Bareilly	148·6
Wana	284·5	Bannu	146·9
Maymyo	241·7	Landikotal	131·9
Jhelum	204·1	Delhi	131·0
Jullundur	197·7	Roorkee	125·3
Thal	191·5	Nowshera	116·1
Fort Sandeman	190·4	Dharamsala	109·4
Lansdowne	174·9	Rawalpindi	109·2
Peshawar	168·2	Jubbulpore	108·5
Kohat	155·1	Poona	101·4
Shillong	153·4		

The stations with an average strength of over 500 and under 1,000 in which malaria admissions exceeded 100 per 1,000 were :—

Shagai	511·5	Jhansi	171·0
Malakand	407·5	Mardan	153·5
Mir Ali	352·4	Aurangabad	151·6
Fatehgarh	294·1	Bakloh	150·9
Ahmedabad	235·8	Multan	132·8
Agra	226·9	Kamptee	109·2
Baroda	182·3		

Treatment and prevention of malaria are dealt with in the Section of the report on British Troops.

Pneumonia.

41. TABLE O.

Years.	Admissions. Actuals.	Admissions. Ratio per 1,000.	Deaths. Actuals.	Deaths. Rate per 1,000.
1931	1,078	8·7	132	1·06
1932	961	7·9	97	0·80
1933	730	6·2	89	0·76
1934	704	6·0	58	0·49
1935	576	4·9	60	0·51
1936	624	5·4	71	0·61

Of the 624 cases admitted 514 were lobar and 110 lobular in type. The case mortality of the two types were 11·09 and 12·73 per cent. respectively.

The incidence by Commands was :—

	Ratio per 1,000.
Northern Command	6·3
Western "	5·1
Eastern "	5·7
Southern "	2·9
Burma District	2·1

Pyrexia of uncertain origin.

42. 10 cases were included under this head giving a ratio of 0·1 per 1,000.

Small-pox.

43. There were 20 admissions with no deaths giving an admission ratio per 1,000 of 0·2. This is practically the same as in 1935.

Tuberculosis.

44. Pulmonary tuberculosis caused 203 admissions with 15 deaths and 193 invalids giving ratios per 1,000 of 1·7, 0·13 and 1·7, respectively.

There were 30 admissions for tuberculosis of other organs with 3 deaths and 15 invalids giving ratios per 1,000 of 0·3, 0·03 and 0·13 respectively. Tuberculosis of various abdominal organs produced 12 admissions.

Venereal Diseases.

45. This group accounted for 1,142 admissions, giving a ratio per 1,000 of 9·8 which was 0·3 per 1,000 less than in 1935.

TABLE P.

Diseases.	Admissions.		Percentage.	
	1935.	1936.	Increase.	Decrease.
Gonorrhœa	543	561	3·31	..
Syphilis	433	397	..	8·31
Soft chancre	210	181	..	13·81

Epidemic Dropsy.

46. In September and October an outbreak of epidemic dropsy occurred among Indian troops at Rangoon and Mingaladon, Burma.

On 27th September 4 men of the Burma Rifles stationed in Rangoon reported sick with swelling, pain and œdema of both legs. The following day 12 more men were found at a medical inspection to have a similar condition and were admitted to hospital. Further inspections of the battalion both at Rangoon and Mingaladon produced a total of 265 cases in the unit and also 40 women. All were rice-eaters. The rice issued to the troops was suspected as the cause and its supply was at once stopped and replaced by specially milled rice. Rice was completely excluded from the diet of the patients and a special diet of milk, meat, atta, dhall, vegetables, fresh fruit, raw eggs and marmite were substituted. No further cases occurred.

None of the cases was really ill but strict confinement to bed was enforced. Most of the cases recovered from the œdema in 2 or 3 days and the average stay in hospital was 5 to 6 days. Samples of the suspected rice were examined at the Military Food Laboratory, Kasauli, and reported to be superior in quality to the normal supplies of Burma rice but in poor condition. The samples had been attacked by weevils and maggots and had an unpleasant smell both raw and when cooked. Moisture 11·8 per cent P205—0·36%. Unfit for issue.

Feeding experiments with the rice were done in Burma and 2 out of 4 pigeons fed on the rice were affected but quickly recovered when the rice was stopped and marmite given. The rice had been received by the R. I. A. S. C. on 19th August 1936 and was kept in modern well ventilated reinforced concrete godowns with asbestos cement roofing. At Rangoon the first issue to troops was made on 21st August 1936 and the first case of œdema occurred on 28th September. At Mingaladon the rice was first issued on September 4th and the first case of œdema occurred on October 4th.

Troops started to consume the rice as soon as it was received from the R. I. A. S. C.

During July, August and September the daily atmospheric temperature in Rangoon and Mingaladon remained between 78° and 84°F and the relative humidity was between 80% and 88%. These figures were much the same as those for the previous year.

It seems quite definite that this outbreak was due to some contamination of the rice supply and not to a deficiency of its P205 content.

Other Diseases due to Infection or Infestation.

47. There were 5,475 admissions under this heading. The most important diseases in this group were :—

Common Cold	1,241	Ascariasis	144
Scabies	894	Chicken Pox	97
Influenza	851	Rheumatic fever	93
Ankylostomiasis	638	Intestinal taeniasis	86
Mumps	599	Kala azar	34
Jaundice catarrhal	197	Filariasis	22
Oriental sore	172	Leprosy	8
Dracontiasis	171	Septicæmia	6
Measles	156	Diphtheria	6

Diseases of the Circulatory System.

48. Circulatory diseases caused 114 admissions to hospital of which the majority were D. A. H. The ratio per 1,000 for admissions was 1·0 which was practically the same as in 1935.

There were 15 deaths from this group of diseases giving a ratio per 1,000 of 0·13 against 0·11, in 1935.

Diseases of the Respiratory System.

49. The admissions for diseases of the respiratory system exclusive of pneumonia and tuberculosis, totalled 1,724 giving a ratio of 14·8 per 1,000. Of these 1,315 or 76 per cent. were due to bronchitis. There were 5 deaths and 31 cases were invalided. The ratio per 1,000 for bronchitis was 11·3 as in 1935.

The other important diseases in the group were pleurisy 217, laryngitis 92 and asthma 59.

Diseases of the Digestive System.

50. There were 5,786 admissions for the diseases of the digestive system with 15 deaths and 18 invalids, the ratios per 1,000 being admissions 49·7, deaths 0·13 and invalids 0·15 respectively.

The most important diseases in this group were :—

TABLE Q.

	Admissions.	Deaths.	Invalids.
Pharyngitis	2,329	..	..
Diarrhœa	726	..	..
Tonsillitis	690	..	..
Indigestion	423	..	..
Constipation	398	..	..
Appendicitis	191	6	2
Hæmorrhoids	189	..	..
Colic	147	..	..
Gastritis	146	..	1
Hepatitis	66	..	..
Jaundice	55	..	..

In addition to the above there were 91 cases of hernia with no death and 4 invalids.

Minor Septic Diseases.

51. This group produced 3,893 admissions giving a ratio of 33·4 per 1,000 of strength. Included in the group were Cellulitis 2,453, Boils 696, Abscess 407 and Inflammation of lymphatic glands and vessels 166.

Local Injuries.

52. There were 6,125 admissions in this group. The ratio per 1,000 was 52·6 compared with 53·1 in 1935.

Followers.

53. The total admissions 7,410 or 279·1 per 1,000 of the strength compared with 302·9 in 1935.

The table below gives figures for certain endemic and infectious diseases amongst followers :—

TABLE R.

	Admissions.			Admissions.	
	Actuals.	Ratio per 1,000.		Actuals.	Ratio per 1,000.
Malaria	2,232	84·1	Dysentery	141	5·3
Bronchitis	381	14·4	Influenza	121	4·6
Venereal diseases*	260	9·8	Diarrhœa	104	3·9
			Scabies	89	3·4
Sandfly fever	228	8·6	Pulmonary tuberculosis.	44	1·7
Pneumonia	207	7·8			
Common cold	143	5·4	Enteric group of fevers.	20	0·8
			Dengue	18	0·7

*Gonorrhœa 123, Syphilis 95 and Soft chancre 42.

There were 85 deaths with a ratio of 3·58 per 1,000 of strength.
The principal causes of death were :—

TABLE S.

	Actuals.	Ratio per 1,000.		Actuals.	Ratio per 1,000.
Pneumonia . . .	24	0·90	Digestive diseases .	5	0·19
Other infectious diseases	13	0·49	Nervous diseases .	3	0·11
Pulmonary tuberculosis.	12	0·45	Poisons . . .	3	0·11
Injuries . . .	11	0·41	Urinary organ diseases	2	0·08
Other respiratory diseases	5	0·19	Disorders of nutrition or of metabolism .	2	0·08

Sick and wounded labourers treated in Labour Camp Hospital at Quetta during 1936 (from May to December).

Diseases.	Admissions.	Deaths.
Cerebro-spinal fever	..	..
Cholera	..	..
Diphtheria	..	..
Dysentery bacillary	2	..
Dysentery bacillary exudate . . .	1	..
Dysentery protozoal	..	..
Dysentery clinical	..	..
Typhoid fever	2	2
Typhoid fever Para A.	..	..
Typhoid fever Para B.	..	..
Typhoid fever Para C.	..	..
Enteric Group	..	..
Malaria	265	..
Oriental sore	4	..
Pneumonia (Lobar and Lobular) . . .	9	3
Small-pox	..	..
Typhus fever	..	..
Local Injuries	102	..
All Other Causes	256	..
TOTAL .	641	5

		Ratio per 1,000 of strength.
Average strength of labourers	—2470 .	
Admission (Actual) . .	— 641	259·5
Average daily sick . . .	— 21·10 . . .	8·54
Deaths	— 5	2·02

Recruiting.

54. The total number of recruits examined at Recruiting Centres in the year ending the 31st March 1937, was 22,843; of these 8,427 were rejected, a percentage of 36·89. The percentage of rejections for the year 1935-36 was 35·99.

The principal causes of rejection of recruits for the year ending 31st March 1937 were as follows:—

Disability.	No. of men rejected as unfit for enrolment out of 22,843 presented at recruiting centres only.		No. of recruits found unfit during training out of 12,464 enrolled (11,386 recruits enrolled at recruiting centres and 1,078 at unit headquarters).	
	Actuals.	Percentage.	Actuals.	Percentage.
1	2	3	4	5
Malaria (enlarged spleen)	522	2·29	2	0·02
Tuberculosis (pulmonary)	157	0·69	7	0·06
Tuberculosis (other organs)	23	0·10	..	..
Venereal diseases	355	1·55	..	..
Other diseases due to infection	48	0·21	1	0·01
Diseases of the nervous system	9	0·04	11	0·09
Defective vision	403	1·76	5	0·04
Trachoma	1,017	4·45	1	0·01
Other eye affections	192	0·84	3	0·02
Otitis media	523	2·29	3	0·02
Defective hearing	11	0·05	..	..
Other ear diseases	140	0·61	..	..
Diseases of nose and throat	138	0·60	..	..
Valvular disease of the heart	388	1·70	1	0·01
Disordered action of heart	826	3·62	4	0·03
Varicose veins	247	1·08	..	..
Hæmorrhoids	148	0·65	..	..
Varicocele	141	0·62	..	..
Other diseases of circulatory system	7	0·03	..	..
Anæmia	115	0·50	1	0·01
Goitre	261	1·14	..	..
Respiratory diseases excluding tuberculosis	33	0·14	2	0·02
Pyorrhœa	154	0·67	..	..
Loss or decay of teeth	27	0·12	..	..
Hernia	358	1.57	1	0·01
Other diseases of digestive system	26	0·11	..	..
Ankylosis of joints	45	0·20	..	..
Flat foot	141	0·62	2	0·02
Knock knee	147	0·64	1	0·01
Curvature of spine	177	0·77		..
Other deformities	335	1·47	13	0·10
Skin diseases	342	1·50	2	0·02
Poor physique	85	0·37	43	0·34
Other causes	886	3·88	39	0·31
Total	8,427	36·89	142	1·14

N.B.—The figures in columns 4 and 5, and in the heading, are in respect of the following only, Cavalry, Infantry Artillery, Signals, Machine Gun Platoons of British Infantry, and Sappers and Miners.

Military Operations.

55. Military operations in Khaisora Valley (Waziristan) during 1936 (25th November to 31st December).

I. O's, I. O. Rs. and Followers.

Average strength. 10,992

Diseases.	Admission to Hospital.		Deaths.	
Admission to hospital.	Actuals.	Ratio per 1,000.	Actuals.	Ratio per 1,000.
All causes	1,341	122·0	8	0·73
Malaria	74	6·7	..	..
Dysentery	21	1·9	..	..
Pneumonia	17	1·5	1	0·09
Minor Septic diseases . . .	47	4·3	..	..
Digestive diseases	155	14·1	..	..
Local injuries excluding G. S. W. .	153	13·9	..	..
G. S. Wounds	144	13·1	7	0·64

APPENDICES.

SECTION I.

BRITISH TROOPS, 1936.

TABLE A.

STATIONS BY COMMANDS AND INDEPENDENT DISTRICTS.

Stations.	Height above M.S. level in feet.	Authority for height.	Points of reference.
Northern Command.			
Abbottabad	4,010	S.D.	Map.
Ambala	902	,,	S.B.M.
Amritsar	754	,,	,,
Bannu	1,250	,,	Map.
Barian Camp and Khyragali	7,133	I.B.	..
Campbellpore	1,180	S.D.	Map.
Cherat	4,546	,,	,,
Dagshai	6,087	,,	,,
Dalhousie Convalescent Depot	7,687	,,	,,
Dera Ismail Khan	568	,,	S.B.M.
Ferozepore	649	,,	,,
Gharial	6,811	S.G.	,,
Jhelum	762	S.D.	,,
Jullundur Cantt.	771	,,	B.M.
Jutogh	6,370	,,	Map
Kalabagh & Baragali	7,963	,,	,,
Kalabagh & Mari Indus	682	,,	,,
Kasauli Convalescent Depot	6,050	,,	..
Kohat	1,725	,,	Map.
Khanspur and Ghora Dhaka	7,721	,,	,,
Kuldana	7,049	S.G.	,,
Lahore Cantt. and Fort	706	S.D.	S.B.M
Landikotal	3,509	,,	Map.
Lockhart Fort	6,613	,,	,,
Manzai	1,650	,,	,,
Mir Ali	2,240	S.G.	V.G.L.
Multan	404	S.D.	S.B.M.
Murree Convalescent Depot	7,073	,,	Map.
Nowshera (Rly. Station)	966	,,	B.M.
Peshawar	1,152	,,	S.B.M.
Rawalpindi	1,689	,,	,,
Razmak	6,556	,,	Map.
Risalpur	1,014	,,	B.M.
Sialkot	829	,,	,,
Solon	5,078	,,	,,
Sabathu	4,000	,,	Map.
Thal	2,450	,,	,,
Wana	4,530	S. G.	V. G. L.
Western Command.			
Hyderabad	93	S.D.	S.B.M.
Karachi (Holy Trinity Church)	28	,,	,,
Quetta	5,510	,,	,,
Eastern Command.			
Agra (Fort)	525	S.D.	S.B.M.
Allahabad & Fort	314	,,	,,
Bareilly	563	,,	,,
Barrackpore	24	,,	,,
Benares	256	,,	,,
Cawnpore	407	,,	B.M.
Chakrata	6,885	,,	Map.
Dacca	20	M.D.	..
Dehra Dun	2,232	S.D.	S.B.M.
Delhi	757	,,	,,
Dinapore	170	,,	Church.
Fort William	17	S.G.	..
Fyzabad	330	S.D.	S.B.M.
Jhansi	849	,,	,,
Landour Convalescent Depot	7,528	,,	..
Lebong	6,000	,,	..
Lucknow Kaiubir's	383	,,	B.M.
Meerut	737	,,	S.B.M.
Muttra	560	,,	,,
Port Blair (Tindal Obsy.)	9	,,	B.M.
Ranikhet and Chaubattia	5,980 6,942	,, S.G.	.. ..
Roorkee	879	S.D.	S.B.M.
Southern Command.			
Ahmedabad	162	S.D.	S.B.M.
Ahmednagar	2,180	,,	Map.
Bangalore	3,002	,,	S.B. M.
Belgaum	2,523	,,	,,
Colaba (Bombay Town Hall)	20	,,	,,
Deolali	1,894	,,	,,
Jubbulpore	1,320	,,	,,
Kamptee (Rly. Station)	940	,,	B.M.
Madras (Obsy.)	250	,,	,,
Malapuram (Rly. Station)	1,380	,,	,,
Mhow	1,887	,,	,,
Mount Abu Sanatorium	3,836	,,	,,
Nasirabad	1,461	,,	Map
Pachmarhi	3,490	,,	,,
Poona	1,867	,,	S.B.M.
Purandhar	4,560	,,	..
Saugor	1,755	,,	S.B.M.
Secunderabad	1,776	,,	,,
Wellington (Stn. Hospital)	5,800	,,	Map.
Burma Ind. District.			
Mandalay (Fort Dufferin)	264	S.D.	Map.
Maymyo	3,508	,,	,,
Mingaladon	118	,,	,,

S.D. = Survey Department.
S.B.M. = Standard Bench Mark.
B.M. = G. T. Bench Mark.
S.G = Surveyor-General of India.
M.D. = Meteorological Department.
V.G.L. = Village ground level.

Map. = Heights taken from Topo. Maps.
I.B. = Intelligence Branch of the Division of the Chief of the Staff.

TABLE I.

INDIA.

WARRANT OFFICERS, N. C. Os. AND MEN.

Table showing the average strength, admissions into hospital, deaths, numbers invalided and constantly sick, during the year 1936, with ratios per 1,000 of the strength.

Diseases. Average strength 52,059.	Actuals.				Ratio per 1,000.			
	Admissions.	Deaths.	Invalids sent home.	Average number constantly sick.	Admissions.	Deaths.	Invalids sent home.	Constantly sick.
SPECIFIC DISEASES DUE TO INFECTION OR INFESTATION.								
Common cold	580	..	..	12·11	11·1	..	..	0·23
Diphtheria	66	1	..	7·86	1·3	0·02	..	0·15
Dysentery	1,283	..	4	59·08	24·6	..	0·08	1·13
Enteric fevers (inclusive of typhoid, para. A, B and C and enteric group.)	76	3	2	11·99	1·5	0·06	0·04	0·23
Erysipelas	4	..	..	0·19	0·1	..	..	0·00
Influenza	646	..	..	17·80	12·4	..	..	0·34
Malaria	3,017	3	2	112·13	58·0	0·06	0·04	2·15
Measles	10	..	..	0·40	0·2	..	..	0·01
Meningococcal infection	1	1	1	0·20	0·0	0·02	0·02	0·00

TABLE I—*contd.*

Diseases.	Actuals. Admissions.	Deaths.	Invalids sent home.	Average number constantly sick.	Ratio per 1,000. Admissions.	Deaths.	Invalids sent home.	Constantly sick.
Average strength 52,059.								
SPECIFIC DISEASES DUE TO INFECTION OR INFESTATION—*contd.*								
Mumps	12	..	..	0·50	0·2	..	..	0·01
Pneumonia	183	20	3	17·56	3·5	0·38	0·06	0·34
Pyrexia of uncertain origin	10	..	..	0·90	0·2	..	..	0·02
Rheumatic fever	73	1	6	10·56	1·4	0·02	0·12	0·20
Sandfly fever	1,758	..	..	34·57	33·8	..	..	0·66
Scarlet fever	7	..	..	0·64	0·1	..	..	0·01
Small-pox	4	1	..	0·45	0·2	0·02	..	0·01
Tuberculosis — Pulmonary	57	1	63	11·98	1·1	0·02	1·21	0·23
Tuberculosis — Other	9	..	9	2·03	0·2	..	0·17	0·04
Venereal diseases — Gonorrhœa	1,340	..	2	172·51	25·7	..	0·04	3·31
Venereal diseases — Soft chancre	241	..	..	25·64	4·6	..	..	0·49
Venereal diseases — Syphilis	214	..	1	19·56	4·1	..	0·02	0·38
Venereal diseases — Other V. D.	3	..	..	0 21	0·1	..	..	0·00
Other diseases due to infection	646	6	3	29·32	12·4	0·12	0·06	0·56
Diseases due to infestation by Metazoan parasites — Scabies	56	..	.	2·11	1·1	..	..	0·04
Diseases due to infestation by Metazoan parasites — Other diseases	197	..	2	4·85	3·8	..	0·04	0·09
OTHER DISEASES CLASSIFIED UNDER SYSTEMS.								
Diseases of the nervous system	434	3	57	20·68	8·3	0·06	1·09	0·40
Mental diseases	145	..	98	32·79	2·8	..	1·88	0·63
Diseases of the :—								
Eye	198	..	27	8·11	3·8	..	0·52	0·16
Ear and nose	1,322	..	14	38·97	25·4	..	0·27	0·75

Circulatory system.	Valvular diseases of the heart.	20	..	20	3·44	0·4	..	0·38	0·07
	Disordered action of the heart	103	6	10	7·00	2·0	0·12	0·19	0·13
	Other diseases	81	8	15	7·23	1·6	0·15	0·29	0·14
Blood and blood forming organs		249	..	4	16·92	4·8	..	0·08	0·33
Ductless or endocrine glands		24	..	7	2·99	0·5	..	0·13	0·06
Breast		22	..	..	0·96	0·4	..	..	0·02
Respiratory system.	Larynx and trachea	43	..	..	1·34	0·8	..	..	0·03
	Bronchi and bronchioles	874	..	21	32·89	16·8	..	0·40	0·63
	Other diseases	110	..	11	10·21	2·1	..	0·21	0·20
Teeth and gums		132	..	..	3·75	2·5	..	..	0·07
Digestive system.	Inflammation of tonsils	1,516	..	..	37·80	29·1	..	..	0·73
	Inflammation of pharynx	462	..	..	9·18	8·9	..	..	0·18
	Inflammation of stomach	357	..	1	14·50	6·9	..	0·02	0·28
	Gastric ulcer	25	..	2	3·42	0·5	..	0·04	0·07
	Duodenal ulcer	34	..	6	3·83	0·7	..	0·12	0·07
	Liver	80	4	4	6·34	1·5	0·08	0·08	0·12
	Other diseases	2,888	13	20	109·79	55·5	0·25	0·38	2·11
Diseases due to disorders of nutrition or of metabolism		16	..	7	2·54	0·3	..	0·13	0·05
Diseases of the:—									
Generative system		16	..	..	37·43	13·8	..	..	0·72
Bones, joints, muscles, fasciæ and bursæ		1,323	..	65	69·32	25·4	..	1·25	1·33
Areolar tissue		2,824	1	1	98·03	54·2	0·02	0·02	1·88
Skin		1,865	..	8	82·59	35·8	..	0·15	1·59
Urinary system		35	4	12	23·86	6·2	0·08	0·23	0·46
Injuries	General	85	19	..	2·98	1·6	0·36	..	0·06
	Local	3,218	31	59	141·99	61·8	0·59	1·13	2·73
	In action	..	..	..	..	..	..	..	..
Tumours and cysts		143	1	5	6·68	2·7	0·02	0·10	0·13
Poisons		9	2	..	0·21	0·2	0·04	..	0·00
No appreciable disease		165	..	..	6·29	3·2	..	..	0·12
*Suicides		..	16	..	..	..	0·31	..	..
Total		30,301	129	572	1,399·21	582·1	2·48	10·99	26·88

* The figures against "Suicides" having already been shown under the heading of the injury, etc., which caused death, are not included in the total.

TABLE II.

WARRANT OFFICERS, N. C. Os. AND MEN—*contd.*

NORTHERN COMMAND.

Table showing the average strength, admissions into hospital, deaths and constantly sick during the year 1936 with ratios per 1,000 of the strength.

Diseases.	Actuals.			Ratio per 1,000.		
	Admissions.	Deaths.	Average number constantly sick.	Admissions.	Deaths.	Constantly sick.
Average strength 16,873.						
SPECIFIC DISEASES DUE TO INFECTION OR INFESTATION.						
Common cold	131	..	2·32	7·8	..	0·14
Diphtheria	27	..	3·98	1·6	..	0·24
Dysentery	352	..	14·64	20·9	..	0·87
Enteric fever (inclusive of typhoid, para. A, B and C and enteric group)	16	1	2·47	0·9	0·06	0·15
Erysipelas	3	..	0·14	0·2	..	0·01
Influenza	227	..	6·35	13·5	..	0·38
Malaria	1,324	..	45·34	78·5	..	2·69
Measles	3	..	0·13	0·2	..	0·01
Meningococcal infection	1	1	0·19	0·1	0·06	0·01
Mumps	4	..	0·17	0·2	..	0·01
Pneumonia	84	10	8·80	5·0	0·59	0·52
Pyrexia of uncertain origin	6	..	0·72	0·3	..	0·04
Rheumatic fever	23	..	2·57	1·4	..	0·15
Sandfly fever	1,354	..	25·13	80·2	..	1·49

Scarlet fever	2	...	0·17	0·1	..	0·01
Small-pox	2	1	0·13	0·1	0·06	0·01
Tuberculosis — Pulmonary	11	1	1·79	0·7	0·06	0·11
Tuberculosis — Other	3	..	0·83	0·2	..	0·05
Venereal diseases — Gonorrhœa	373	..	45·83	22·1	..	2·72
Venereal diseases — Soft chancre	39	..	4·74	2·3	..	0·28
Venereal diseases — Syphilis	56	..	5·81	3·3	..	0.34
Venereal diseases — Other V. D.	1	..	0·05	0·1	..	0·00
Other diseases due to infection	130	4	8·09	7·7	0·24	0·48
Diseases due to infestation by Metazoan parasites — Scabies	17	..	0·82	1·0	..	0·05
Diseases due to infestation by Metazoan parasites — Other diseases	41	..	0·80	2·4	..	0·05
OTHER DISEASES CLASSIFIED UNDER SYSTEMS.						
Diseases of the nervous system	122	2	7·03	7·2	0·12	0·42
Mental diseases	31	..	6·56	1·8	..	0·39
Diseases of the eye	57	..	1·89	3·4	..	0·11
Diseases of the ear and nose	404	..	12·03	23·9	..	0·72
Diseases of the Circulatory system — Valvular disease of the heart	8	..	1·59	0·5	..	0·09
Diseases of the Circulatory system — Disordered action of the heart	21	4	1·55	1·2	0·24	0·09
Diseases of the Circulatory system — Other diseases	28	2	2·51	1·7	0·12	0·15
Diseases of blood and blood forming organs	68	..	3·73	4·0	..	0·22
Diseases of ductless or endocrine glands	9	..	1·25	0·5	..	0·07
Diseases of the breast	8	..	0·36	0·5	..	0·02
Diseases of the Respiratory system — Larynx and trachea	15	..	0·49	0·9	..	0·03
Diseases of the Respiratory system — Bronchi and bronchioles	302	..	10·39	17·9	..	0·62
Diseases of the Respiratory system — Other diseases	40	..	3·30	2·4	..	0·20
Diseases of the teeth and gums	31	..	0·61	1·8	..	0·04
Diseases of the Digestive system — Inflammation of tonsils	510	..	13·51	30·2	..	0·80
Diseases of the Digestive system — Inflammation of pharynx	117	..	2·24	6·9	..	0·13
Diseases of the Digestive system — Inflammation of stomach	122	..	5·04	7·2	..	0·30
Diseases of the Digestive system — Gastric ulcer	6	..	1·10	0·4	..	0·07
Diseases of the Digestive system — Duodenal ulcer	6	..	0·59	0·4	..	0·03
Diseases of the Digestive system — Liver	25	..	2·33	1·5	..	0·14
Diseases of the Digestive system — Other diseases	844	6	30·95	50·0	0·36	1·83

TABLE II—*contd.*

Diseases.	Actuals.			Ratio per 1,000.		
Average strength 16,873.	Admissions.	Deaths.	Average number constantly sick.	Admissions.	Deaths.	Constantly sick.
Diseases due to disorders of nutrition or of metabolism	2	..	0·50	0·1	..	9·03
Diseases of the generative system	199	..	9·10	11·8	..	0·54
Diseases of bones, joints, muscles, fasciæ and bursæ	463	..	23·42	27·4	..	1·39
Diseases of the areolar tissue	950	1	30·67	56·3	0·06	1·82
Diseases of the skin	517	..	22·09	30·6	..	1·31
Diseases of the urinary system	101	2	8·83	6·0	0·12	0·52
Injuries—General	50	6	1·66	3·0	0·36	0·10
Injuries—Local	1,086	9	45·40	64·4	0·53	2·69
Injuries—In action	..	..	..	..	..	..
Tumours and cysts	48	1	2·37	2·8	0·0	0·14
Poisons	3	1	0·09	0·2	0·0	0·01
No appreciable diseas	46	..	1·71	2·7	..	0·10
*Suicides	..	5	..	..	0·30	..
Total	10,468	52	436·95	620·4	3·08	25·90

* The figures against "Suicides" having already been shown under the heading of the injury, etc., which caused death, are not included in the total.

TABLE III.

WARRANT OFFICERS, N. C. Os. AND MEN—*contd.*

WESTERN COMMAND.

Table showing the average strength, admissions into hospital, deaths, and constantly sick, during the year 1936, with the ratios per 1,000 of the strength.

Diseases.	Actuals.			Ratio per 1,000.		
Average strength 3,204.	Admissions.	Deaths.	Average number constantly sick.	Admissions.	Deaths.	Constantly sick.
SPECIFIC DISEASES DUE TO INFECTION OR INFESTATION.						
Common cold	155	..	3·70	48·4	..	1·15
Diphtheria	3	..	0·31	0·9	..	0·10
Dysentery	113	.	5·80	35·3	..	1·81
Enteric fever (inclusive of typhoid, para. A, B and C and enteric group)	1	..	0·25	0·3	..	0·08
Erysipelas	..	..	..	..	..	..
Influenza	30	..	1·10	9·4	..	0·34
Malaria	333	2	9·97	103·9	0·62	3·11
Measles	1	..	0·04	0·3	..	0·01
Meningococcal infection	..	..	..	..	..	..
Mumps	..	..	..	..	..	..
Pneumonia	10	..	0·98	3·1	..	0·31
Pyrexia of uncertain origin	..	..	..	..	..	..
Rheumatic fever	3	..	0·39	0·9	..	0·12
Sandfly fever	51	..	1·50	15·9	..	0·47

TABLE III—*contd.*

Diseases. Average strength 3,204.	Actuals.			Ratio per 1,000.		
	Admissions.	Deaths.	Average number constantly sick.	Admissions.	Deaths.	Constantly sick.
SPECIFIC DISEASES DUE TO INFECTION OR INFESTATION—*contd.*						
Scarlet fever	..	..	..	..	..	..
Small-pox	..	..	..	..	..	..
Tuberculosis — Pulmonary	6	..	0·77	1·9	..	0·24
Tuberculosis — Other	1	..	0·13	0·3	..	0·04
Venereal diseases — Gonorrhœa	63	..	8·66	19·7	..	2·70
Venereal diseases — Soft chancre	23	..	3·15	7·2	..	0·98
Venereal diseases — Syphilis	8	..	0·66	2·5	..	0·21
Venereal diseases — Other V. D.	..	..	..	..	..	..
Other diseases due to infection	62	..	2·97	19·4	..	0·93
Diseases due to infestation by Metazoan parasites — Scabies	1	..	0·01	0·3	..	0·00
Diseases due to infestation by Metazoan parasites — Other diseases	7	..	0·15	2·2	..	0·05
OTHER DISEASES CLASSIFIED UNDER SYSTEMS.						
Diseases of the nervous system	35	..	2·14	10·9	..	0·67
Mental diseases	18	..	3·09	5·6	..	0·96
Diseases of the—						
Eye	12	..	0·48	3·7	..	0·15
Ear and nose	66	..	2·24	20·6	..	0·70
Circulatory system — Valvular diseases of the heart	..	..	..	..	..	..
Circulatory system — Disordered action of the heart	19	..	1·38	5·9	..	0·43
Circulatory system — Other diseases	11	1	1·15	3·4	0·31	0·36
Blood and blood forming organs	10	.	0·64	3·1	..	0·20
Ductless or endocrine glands	1	..	0·07	0·3	..	0·02
Breast	1	..	0·02	0·3	..	0·01
Respiratory system — Larynx and trachea	1	..	0·02	0·3	..	0·01
Respiratory system — Bronchi and bronchioles	52	..	3·49	16·2	..	1·09
Respiratory system — Other diseases	8	..	1·97	2·5	..	0·61

Teeth and gums	7	..	0·10	2·2	..	0·03
Digestive system. — Inflammation of tonsils	126	..	3·77	39·3	..	1·18
Inflammation of pharynx	22	..	0·42	6·9	..	0·13
Inflammation of stomach	26	..	0·81	8·1	..	0·25
Gastric ulcer	1	..	0·48	0·3	..	0·15
Duodenal ulcer	5	..	0·46	1·6	..	0.14
Liver	4	..	0·43	1·2	..	0·13
Other diseases	247	..	10·40	77·1	..	3·25
Diseases due to disorders of nutrition or of metabolism	2	..	0·59	0·6	..	0·18
Diseases of the :—						
Generative system	31	..	1·77	9·7	..	0·55
Bones, joints, muscles, fasciæ and bursæ	75	..	3·59	23·4	..	1·12
Areolar tissue	178	..	6·87	55·6	..	2·14
Skin	155	..	7·29	48·4	..	2·28
Urinary system	17	..	1·31	5·3	..	0·41
Injuries — General	6	1	0·34	1·9	0·31	0·11
Local	218	3	9·75	68·0	0·94	3·04
In action	..	..	..	..	..	..
Tumours and cysts	7	..	0·55	2·2	..	0·17
Poisons	3	1	0·04	0·9	0·31	0·01
No appreciable disease	..	..	..	..	..	..
Suicides	..	3	..	..	0·94	..
Total	2,235	8	106·20	697·6	2·50	33·15

The figures against "Suicides" having already been shown under the heading of the injury, etc. which caused death, are not included in the total.

TABLE IV.

WARRANT OFFICERS, N. C. Os. AND MEN—*contd.*

EASTERN COMMAND.

Table showing the average strength, admissions into hospital, deaths and constantly sick, during the year 1935, with ratios per 1,000 of the strength.

Diseases. Average strength, 15,683.	Actuals.			Ratio per 1,000.		
	Admissions.	Deaths.	Average number constantly sick.	Admissions.	Deaths.	Constantly sick.
SPECIFIC DISEASES DUE TO INFECTION OR INFESTATION.						
Common cold	134	..	2·54	8·5	..	0·16
Diphtheria	10	1	1·09	0·6	0·06	0·07
Dysentery	434	..	21·25	27·7	..	1·35
Enteric fever (inclusive of typhoid, para. A, B and C and enteric group)	42	2	6·87	2·7	0·13	0·44
Erysipelas	1	..	0·05	0·1	..	0·00
Influenza	339	..	8·99	21·6	..	0·57
Malaria	577	..	27·21	36·8	..	1·73
Measles	6	..	0·23	0·4	..	0·01
Meningococcal infection	..	..	..	..	..	..
Mumps	6	..	0·26	0·4	..	0·02
Pneumonia	54	7	4·53	3·4	0·45	0·29
Pyrexia of uncertain origin	1	..	0·05	0·1	..	0·00
Rheumatic fever	20	1	2·74	1·3	0·06	0·17
Sandfly fever	180	..	3·91	11·5	..	0·25

Scarlet fever	3	..	0·33	0·2	..	0·02
Small-pox	1	..	0·11	0·1	..	0·01
Tuberculosis — Pulmonary	15	..	3·36	1·0	..	0·21
Tuberculosis — Other	2	..	0·57	0·01	..	0·04
Venereal diseases — Gonorrhœa	466	..	56·95	29·7	..	3·63
Venereal diseases — Soft chancre	90	..	9·04	5·7	..	0·58
Venereal diseases — Syphilis	61	..	5·44	3·9	..	0·35
Venereal diseases — Other V. D.	..	..	..	..	..	..
Other diseases due to infection	205	2	9·42	13·1	0·13	0·60
Diseases due to infestation by Metazoan parasites — Scabies	14	..	0·63	0·9	..	0·04
Diseases due to infestation by Metazoan parasites — Other diseases	69	..	1·89	4·4	..	0·12
OTHER DISEASES CLASSIFIED UNDER SYSTEMS.						
Diseases of the nervous system	158	1	5·79	10·1	0.06	0·37
Mental diseases	49	..	8·97	3·1	..	0·57
Diseases of the eye	78	..	3·39	5·0	..	0·22
Diseases of the ear and nose	456	..	12·38	29·1	..	0·79
Circulatory system — Valvular diseases of the heart	4	..	0·35	0·3	..	0·02
Circulatory system — Disordered action of the heart	29	1	1·42	1·8	0·06	0·09
Circulatory system — Other diseases	16	..	1·45	1·0	..	0·09
Blood and blood forming organs	87	..	6·60	5·5	..	0·42
Ductless or endocrine glands	7	..	1·05	0·4	..	0·07
Breast	5	..	0·16	0·3	..	0·01
Respiratory system — Larynx and trachea	20	..	0·66	1·3	..	0·04
Respiratory system — Bronchi and bronchioles	263	..	8·43	16·8	..	0·54
Respiratory system — Other diseases.	28	..	1·93	1·8	..	0·12
Teeth and gums	43	..	1·33	2·7	..	0·08
Digestive system — Inflammation of tonsils	416	..	9·58	26·5	..	0·61
Digestive system — Inflammation of pharynx	165	..	3·14	10·5	..	0·20
Digestive system — Inflammation of stomach	98	..	3·00	6·2	.	0·19
Digestive system — Gastric ulcer	3	..	0·37	0·2	.	0·02
Digestive system — Duodenal ulcer	18	..	2·43	1·1	..	0·15
Digestive system — Liver	25	..	1·97	1·6	..	0·13
Digestive system — Other diseases	617	6	33·29	58·5	0·38	2·12

TABLE IV—*contd.*

Diseases. Average strength, 15,863.	Actuals. Admissions.	Deaths.	Average number constantly sick.	Ratio per 1,000. Admissions.	Deaths.	Constantly sick.
OTHER DISEASES CLASSIFIED UNDER SYSTEMS—*contd.*						
Diseases due to disorders of nutrition or of metabolism	5	..	0·86	0·3	..	0·05
Diseases of the generative system	253	..	15·81	16·1	..	1·01
Diseases of bones, joints, muscles, fasciæ and bursæ	418	..	22·43	26·7	..	1·43
Diseases of the areolar tissue	769	..	27·27	49·0	..	1·74
Diseases of the skin	657	..	27·78	41·9	..	1·77
Diseases of the urinary system	83	..	6·01	5·3	..	0·38
Injuries — General	18	4	0·08	1·1	0·26	0·05
Injuries — Local	978	8	43·89	62·4	0·51	2·80
Injuries — In action	..	..	..	..	..	..
Tumours and cysts	57	..	2·19	3·6	..	0·14
Poisons	1	..	0·01	0·1	..	0·00
No appreciable disease	55	..	2·36	3·5	..	0·15
*Suicides	..	3	..	..	0·19	..
Total	8,909	33	424·56	568·1	2·10	27·07

*The figures against "Suicides" having already been shown under the heading of the injury, etc., which caused death, are not included in the total.

TABLE V.

WARRANT OFFICERS, N. C. Os. AND MEN—*contd.*

SOUTHERN COMMAND.

Table showing the Average Strength, Admissions into Hospital, Deaths and Constantly. Sick, during the year 1936, with Ratios per 1,000 of the Strength.

Diseases.	Actuals.			Ratio per 1,000.		
	Admissions.	Deaths.	Average number constantly sick.	Admissions.	Deaths.	Constantly sick.
Average strength 14,544.						
SPECIFIC DISEASES DUE TO INFECTION OR INFESTATION.						
Common cold	147	..	3·25	10·1	..	0·22
Diphtheria	23	..	2·22	1·6	..	0·15
Dysentery	340	..	14·97	23·4	..	1·03
Enteric fever (inclusive of Typhoid, Para. A, B and C and enteric group).	10	..	1·46	0·7	..	0·10
Erysipelas	..	..	..	..	..	..
Influenza	47	..	1·27	3·2	..	0·09
Malaria	659	1	25·34	45·3	0·07	1·74
Measles	..	..	..	..	..	..
Meningococcal infection	..	..	0·01	..	..	0·00
Mumps	1	..	0·04	0·1	..	0·00
Pneumonia	31	3	2·71	2·1	0·21	0·19
Pyrexia of uncertain origin	2	..	0·03	0·1	..	0·00
Rheumatic fever	26	..	4·79	1·8	..	0·33
Sandfly fever	167	..	3·76	11·5	..	0·26

TABLE V—*contd.*

Diseases.	Actuals.			Ratio per 1,000.		
Average strength—14,544.	Admissions.	Deaths.	Average number constantly sick.	Admissions.	Deaths.	Constantly sick.
SPECIFIC DISEASES DUE TO INFECTION OR INFESTATION—*contd.*						
Scarlet fever	2	..	0·14	0·1	..	0·01
Small-pox	1	..	0·21	0·1	..	0·01
Tuberculosis — Pulmonary	24	..	5·59	1·7	..	0·38
Tuberculosis — Other	3	..	0·45	0·2	..	0·03
Venereal diseases — Gonorrhœa	373	..	51·14	25·6	..	3·52
Venereal diseases — Soft chancre	75	..	7·50	5·2	..	0·52
Venereal diseases — Syphilis	63	..	5·66	4·3	..	0·39
Venereal diseases — Other V. D.	..	..	..	..	..	..
Other diseases due to infection	205	..	7·48	14·1	..	0·51
Diseases due to infestation by Metazoan parasites — Scabies	16	..	0·38	1·1	..	0·03
Diseases due to infestation by Metazoan parasites — Other diseases	67	..	1·63	4·6	..	0·11
OTHER DISEASES CLASSIFIED UNDER SYSTEMS.						
Diseases of the nervous system	96	..	5·14	6·6	..	0·35
Mental diseases	43	..	14·06	3·0	..	0·97
Diseases of the eye	39	..	1·80	2·7	..	0·12
Diseases of the ear and nose	286	..	9·89	19·7	..	0·68
Diseases of the circulatory system — Valvular disease of the heart	7	..	1·49	0·5	..	0·10
Diseases of the circulatory system — Disordered action of the heart	33	1	2·62	2·3	0·07	0·18
Diseases of the circulatory system — Other diseases	23	4	1·99	1·6	0·28	0·14
Diseases of the blood and blood forming organs	73	..	5·19	5·0	..	0·36
Diseases of ductless or endocrine glands	4	..	0·42	0·3	..	0·03
Diseases of the breast	8	..	0·42	0·6	..	0·03

Diseases of the respiratory system.	Larynx and trachea	5	..	0·09	0·3	..	0·01
	Bronchi and bronchioles	225	..	9·22	15·5	..	0·63
	Other diseases	32	..	2·92	2·2	..	0·20
Diseases of the teeth and gums		29	..	1·16	2·0	..	0·08
Diseases of the digestive system.	Inflammation of tonsils	413	..	9·76	28·4	..	0·67
	Inflammation of pharynx	128	..	2·66	8·8	..	0·18
	Inflammation of stomach	107	..	5·52	7·4	..	0·38
	Gastric ulcer	15	..	1·47	1·0	..	0·10
	Duodenal ulcer	5	..	0·35	0·3	..	0·02
	Liver diseases	16	4	1·02	1·1	0·28	0·07
	Other diseases	781	1	31·18	53·7	0·07	2·14
Diseases due to disorders of nutrition or of metabolism		7	..	0·59	0·5	..	0·04
Diseases of the generative system		205	..	9·33	14·1	..	0·64
Diseases of bones, joints, muscles, fasciæ and bursæ		322	..	18·20	22·1	..	1·25
Diseases of the areolar tissue		717	..	27·80	49·3	..	1·91
Diseases of the skin		447	..	20·93	30·7	..	1·44
Diseases of the urinary system		95	2	3·50	6·5	0·14	0·45
Injuries	General	11	8	0·18	0·8	0·55	0·01
	Local	801	9	36·42	55·1	0·62	2·50
	In action	..	..	..	..	..	..
Tumours and cysts		28	..	1·37	1·9	..	0·09
Poisons		1	..	0·03	0·1	..	0·00
No appreciable disease		47	..	1·89	3·2	..	0·13
*Suicides.		..	4	..	..	0·28	..
	Total	7331	33	371·64	504·1	2·27	25·55

*The figures against "Suicides" having already been shown under the heading of the injury, etc., which caused death, are not included in the total.

TABLE VI.

WARRANT OFFICERS, N. C. Os. AND MEN—*contd.*

BURMA DISTRICT.

Table showing the average strength, admissions into hospital, deaths and constantly sick, during the year 1936, with ratios per 1,000 of the strength.

Diseases.	Actuals.			Ratio per 1,000.		
	Admissions.	Deaths.	Average number constantly sick.	Admissions.	Deaths.	Constantly sick.
Average strength—1,755.						
SPECIFIC DISEASES DUE TO INFECTION OR INFESTATION.						
Common cold	13	..	0·30	7·4	..	0·17
Diphtheria	3	..	0·26	1·7	..	0·15
Dysentery	44	..	2·42	25·1	..	1·38
Enteric fever (inclusive of typhoid, para A, B and C and enteric group).	7	..	0·94	4·0	..	0·54
Erysipelas	..	..	..	..	..	..
Influenza	3	..	0·09	1·7	..	0·05
Malaria	124	..	4·27	70·7	..	2·43
Measles	..	..	..	..	..	..
Meningococcal infection	..	..	..	..	..	..
Mumps	1	..	0·03	0·6	..	0·02
Pneumonia	4	..	0·54	2·3	..	0·31
Pyrexia of uncertain origin	2	..	0·10	1·1	..	0·06
Rheumatic fever	1	..	0·07	0·6	..	0·04
Sandfly fever	6	..	0·27	3·4	..	0·15
Scarlet fever	..	..	..	..	..	..
Small-pox	..	..	..	..	..	..

Tuberculosis — Pulmonary	1	..	0·47	0·6	..	0·27
Tuberculosis — Other	..	..	..	..	..	..
Venereal diseases — Gonorrhœa	65	..	9·93	37·0	..	5·66
Venereal diseases — Soft chancre	14	..	1·21	8·0	..	0·69
Venereal diseases — Syphilis	26	..	1·99	14·8	..	1·13
Venereal diseases — Other V. D.	2	..	0·14	1·1	..	0·08
Other diseases due to infection	44	..	1·43	25·1	..	0·81
Diseases due to infestation by Metazoan parasites — Scabies	8	..	0·27	4·6	..	0·15
Diseases due to infestation by Metazoan parasites — Other diseases	13	..	0·38	7·4	..	0·22

OTHER DISEASES CLASSIFIED UNDER SYSTEMS.

Diseases of the nervous system	23	..	0·58	13·1	..	0·33
Mental diseases	4	..	0·11	2·3	..	0·06
Diseases of the eye	12	..	0·55	6·8	..	0·31
Diseases of the ear and nose	110	..	2·38	62·7	..	1·36
Diseases of the circulatory system — Valvular disease of the heart	1	..	0·01	0·6	..	0·01
Diseases of the circulatory system — Disordered action of the heart	1	..	0·03	0·6	..	0·02
Diseases of the circulatory system — Other diseases	3	1	0·13	1·7	0·57	0·07
Diseases of the blood and blood forming organs	11	..	0·76	6·3	..	0·43
Diseases of the ductless or endocrine glands	3	..	0·20	1·7	..	0·11
Diseases of the breast	..	..	..	..	..	..
Diseases of the respiratory system — Larynx and trachea	2	..	0·08	1·1	..	0·05
Diseases of the respiratory system — Bronchi and bronchioles	32	..	1·35	18·2	..	0·20
Diseases of the respiratory system — Other diseases	2	..	0·10	1·1	..	0·06
Diseases of the teeth and gums	22	..	0·55	12·5	..	0·31
Diseases of the digestive system — Inflammation of tonsils	51	..	1·18	29·1	..	0·67
Diseases of the digestive system — Inflammation of pharynx	30	..	0·72	17·1	..	0·41
Diseases of the digestive system — Inflammation of stomach	4	..	0·13	2·3	..	0·07
Diseases of the digestive system — Gastric ulcer	..	..	..	..	..	..
Diseases of the digestive system — Duodenal ulcer	..	..	..	..	..	..
Diseases of the digestive system — Liver	10	..	0·59	5·7	..	0·34
Diseases of the digestive system — Other diseases	99	..	3·97	56·4	..	2·26

TABLE VI—*contd.*

Diseases.	Actuals.			Ratio per 1,000.		
	Admissions.	Deaths.	Average number constantly sick.	Admissions.	Deaths.	Constantly sick.
Average strength—1,755.						
OTHER DISEASES CLASSIFIED UNDER SYSTEMS—*contd.*						
Diseases due to disorders of nutrition or of metabolism	..	..	..	..	..	..
Diseases of the generative system	28	..	1·42	16·0	..	0·81
Diseases of the bones, joints, muscles, fasciæ and bursæ	45	..	1·68	25·6	..	0·96
Diseases of the areolar tissue	210	..	5·42	119·7	..	3·09
Diseases of the skin	89	..	4·50	50·7	..	2·56
Diseases of the urinary system	29	..	1·21	16·5	..	0·69
Injuries—General	..	..	..	..	..	..
Injuries—Local	135	2	6·53	76·9	1·14	3·72
Injuries—In action	..	..	..	..	..	..
Tumours and cysts	3	..	0·20	1·7	..	0·11
Poisons	1	..	0·04	0·6	..	0·02
No appreciable disease	17	..	0·33	9·7	..	0·19
*Suicide	..	1	..	..	0·57	..
Total	1358	3	59·86	773·8	1·71	34·11

*The figures against "suicides" having already been shown under the heading of the injury, etc., which caused death, are not included in the total.

TABLE VII.

BRITISH OTHER RANKS.

Table showing monthly ratios per 1,000 of the strength of admissions for certain diseases for all India during the year 1936.

1936.	Enteric group of fevers.	Influenza.	Cholera.	Small-pox.	Malaria.	Dysentery protozoal.	Dysentery bacillary.	Dysentery bacillary exudative.	Dysentery group.	Pyrexia of uncertain origin.	Pneumonia (Lobar and Lobular).	Diarrhœa.	Dengue.	Sandfly fever.	Plague.	Effects of Heat.	All Causes.
January	0·1	1·5	..	..	1·5	0·2	0·4	0·2	0·2	..	0·4	0·4	0·3	0·3	..	..	39·3
February	0·1	2·2	..	0·04	1·8	0·1	0·5	0·1	0·1	0·02	0·5	0·6	0·1	0·1	..	..	34·8
March	0·2	1·4	..	0·02	1·3	0·2	0·8	0·6	0·2	..	0·2	1·4	0·1	0·7	..	..	39·4
April	0·3	0·8	..	..	2·1	0·3	1·2	0·8	0·7	0·1	0·3	2·7	0·2	2·5	..	..	44 2
May	0·2	0·9	0·1	0·0	2·5	0·2	1·1	0·6	0·4	0·1	0·3	2·1	0·2	7·7	..	0·3	57·3
June	0·2	0·6	0·0	..	4·6	0·1	0·8	0·5	0·4	..	0·3	1·5	0·5	5·4	..	0·3	54·0
July	0·1	1·2	..	..	5·7	0·2	1·6	0·8	0·6	..	0·4	2·0	0·5	6·0	..	0·1	59·7
August	0·2	1·9	..	..	9·5	0·2	1·3	0·5	0·4	..	0·3	1·7	0·5	4·7	..	0·1	62·0
September	0·0	0·4	..	..	9·5	0·2	1·0	0·6	0·4	..	0·1	0·9	0·9	3·9	..	0·0	54·4
October	0·1	0·4	..	..	9·5	0·2	0·9	0·3	0·7	..	0·2	0·9	0·8	1·5	..	..	50·5
November	0·1	0·6	..	..	6·6	0·2	0·9	0·4	0·4	..	0·2	1·2	0·4	0·4	..	..	46·1
December	0·1	0·5	..	..	3·1	0·2	0·5	0·4	0·3	..	0·3	0·9	0·4	0·3	..	..	38·1
Total	1·6	12·8	0·1	0·1	57·7	2·5	11·1	5·8	4·9	0·2	3·4	16·4	4·7	33·6	..	0·8	580·5

TABLE

BRITISH

Table showing ratios per 1,000 of strength of admissions for certain India

Stations and Districts.	Average annual strength.	Enteric group of fevers.					Dysentery.			
		Typhoid fever.	Para A.	Para B.	Para C.	Enteric group.	Bacillary Bact.	Bacillary exudate.	Protozoal.	Clinical.
Cherat	429	..	..	..	..	..	2·3	2·3	..	11·7
Landikotal	794	..	..	..	..	1·3	3·8	5·0	..	30·2
Nowshera	1,162	..	..	..	..	..	3·4	2·6	0·9	0·9
Peshawar	1,273	..	..	..	0·8	1·6	20·4	7·9	1·6	5·5
Risalpur	711	..	..	..	..	..	1·4	..	1·4	1·4
Peshawar District	4,369	..	..	..	0·2	0·7	8·0	4·1	0·9	8·7
Kohat	165	..	..	..	..	..	6·1	..	..	..
Fort Lockhart	8	..	..	..	..	..	..	..	..	..
Thall	4	..	..	..	..	..	..	..	..	..
Kohat District	177	..	..	..	..	..	5·6	..	..	..
Abbottabad	149	..	..	..	..	..	26·8	..	..	13·4
Barian	250	..	..	..	..	..	4·0	..	..	..
Campbellpore	129	..	..	..	..	..	7·8	..	..	7·8
Gharial	447	..	..	..	..	..	..	4·5	..	..
Jhelum	10	..	..	..	..	..	..	..	..	..
Kalabagh (Hazara)	84	..	..	..	..	..	..	..	..	11·9
Khanspur	181	..	..	..	..	..	..	22·1	..	5·5
Kuldana	308	..	..	..	..	..	3·2	..	..	..
Murree	125	..	8·0	..	..	..	16·0	..	32·0	..
Rawalpindi	2,441	1·2	..	..	..	..	4·1	1·2	5·7	4·5
Rawalpindi District	4,124	0·7	0·2	..	..	..	4·6	2·2	4·4	3·9
Ambala	666	1·5	..	..	..	..	3·0	7·5	7·5	13·5
Dagshai	419	..	..	..	..	..	2·4	..	..	4·8
Amritsar	162	..	..	..	..	..	..	6·2	..	..
Dalhousie	463	..	..	..	..	..	23·8	6·5	..	8·6
Ferozepore	761	..	..	..	..	..	1·3	7·9	..	22·3
Jullundur	652	..	..	..	..	..	1·5	1·5	..	19·9
Jutogh	187	..	..	..	..	..	5·3	5·3	..	..
Kasauli	263	7·6	..	..	..	..	11·4	7·6	3·8	3·8
Lahore	1,112	..	..	..	..	1·8	3·6	5·4	0·9	7·2
Multan	608	..	..	..	..	1·6	6·6	6·6	..	6·6
Subathu	189	..	..	..	..	..	5·3	..	..	..
Sialkot	1,259	..	..	..	..	3·2	4·0	7·1	0·8	3·2
Solon	128	..	..	..	..	..	..	..	..	..
Lahore District	6,868	0·4	...	..	..	1·0	4·9	5·5	1·2	9·0
Bannu	113	..	..	..	..	..	70·8	8·8	..	97·3
Dera Ismail Khan	49		..	..	..	..	..	..	..	..
Kalabagh and Marl Indus	14	..	..	..	..	..	..	..	..	71·4
Manzai	12	..	..	..	..	..	..	..	..	..
Razmak	1,062	..	..	..	..	..	13·2	0·9	..	3·8
Mir Ali	9	..	..	..	..	..	..	..	..	..
Wana	76	..	..	..	..	..	..	..	..	26·3

VIII.

OTHER RANKS.

diseases and constantly sick for all causes in each station and district in during 1936.

Diarrhœa.	Cholera.	Venereal diseases.	Small-pox.	Malaria.	Dengue.	Sandfly fever.	Plague.	Influenza.	Pneumonia (Lobar and Lobular).	Heat-stroke.	Heat-exhaustion.	All Causes.	Average annual number constantly sick.
21·0	..	16·3	..	186·5	..	49·0	..	14·0	..	..	..	648·0	18·37
7·6	..	17·6	..	104·5	..	405·5	..	32·7	5·0	..	1·3	950·9	20·42
21·5	..	22·4	..	96·4	..	194·5	..	4·3	6·9	..	..	728·1	25·28
16·5	..	42·4	..	146·9	..	298·5	..	1·6	7·9	..	..	923·0	40·29
11·3	..	2·8	..	19·7	..	28·1	..	1·4	5·6	..	1·4	288·3	6·91
15·8	..	23·7	..	103·9	..	221·8	..	9·2	6·0	..	0·5	745·9	25·10
24·2	..	12·1	..	103·0	..	78·8	..	30·3	12·1	..	6·1	666·6	29·45
..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..
22·6	..	11·3	..	96·0	..	73·4	..	28·2	11·3	..	5·6	621·5	27·46
127·5	..	13·4	..	120·8	..	6·7	..	..	6·7	..	..	718·1	21·68
8·0	..	84·0	..	128·0	..	40·0	..	..	4·0	..	..	556·0	43·40
..	..	7·8	..	100·8	..	23·3	..	..	..	..	..	434·1	11·78
11·2	..	..	..	196·9	..	20·1	..	2·2	..	..	..	422·8	11·25
..	..	..	..	300·0	..	100·0	..	..	..	..	..	500·0	7·00
11·9	..	35·7	..	35·7	..	23·8	..	..	..	..	..	381·0	12·86
5·5	..	..	..	38·7	..	5·5	..	5·5	..	..	..	370·2	15·03
3·2	..	6·5	..	22·7	..	13·0	..	22·7	..	..	..	314·9	10·75
16·0	..	..	..	120·0	..	16·0	..	8·0	8·0	..	..	1,408·0	164·56
5·3	..	29·1	..	103·2	..	34·8	..	27·4	6·1	0·4	0·4	527·7	21·93
10·7	..	24·2	..	106·2	..	28·6	..	18·7	4·4	0·2	0·2	522·8	24·71
10·5	..	31·5	..	70·6	..	12·0	..	..	..	..	..	465·5	23·41
11·9	..	47·7	..	21·5	..	71·6	..	..	4·8	..	..	568·0	18·40
..	..	117·3	..	18·5	..	24·7	..	6·2	6·2	..	..	808·6	41·67
6·5	..	25·9	2·2	19·4	..	2·2	..	13·0	4·3	..	..	591·8	28·19
13·1	..	42·0	1·3	76·2	..	55·2	..	49·9	3·9	1·3	..	662·3	26·32
24·5	..	26·1	..	7·7	..	21·5	..	3·1	9·2	..	..	630·4	21·78
..	..	42·8	..	10·7	..	..	..	..	..	..	5·3	743·3	20·86
22·8	..	3·8	..	53·2	..	..	..	7·6	..	..	..	642·6	50·11
15·3	..	62·1	..	31·5	1·8	26·1	..	13·5	6·3	1·8	2·7	634·0	35·19
9·9	..	23·0	..	176·0	..	82·2	..	9·9	1·6	4·9	6·6	684·2	25·20
10·6	..	5·3	..	31·7	..	31·7	..	..	..	..	..	444·4	12·01
38·1	..	27·8	..	6·4	..	30·2	..	6·4	2·4	2·4	2·4	584·6	23·08
..	..	7·8	..	..	..	39·1	..	..	..	..	..	187·5	4·61
17·5	..	36·4	0·3	44·1	0·3	33·1	..	11·4	3·6	1·3	1·6	602·9	26·32
35·4	..	..	..	115·0	..	230·1	..	..	..	..	8·8	911·5	29·82
..	..	20·4	..	244·9	..	..	..	61·2	..	..	20·4	510·2	14·49
..	..	..	..	..	..	..	..	..	..	..	..	214·3	3·57
15·1	..	1·9	..	83·3	..	83·3	..	..	..	..	..	166·7	5·00
..	..	..	..	43·3	..	..	..	13·2	5·6	..	..	555·6	26·85
26·3	..	26·3	..	..	..	..	..	..	..	..	..	11·1	0·33
			..	197·4	..	..	..	26·3	13·2	..	..	960·5	27·24

TABLE

Stations and Districts.	Average annual strength.	Enteric group of fevers.					Dysentery.			
		Typhoid fever.	Para A.	Para B.	Para C.	Enteric group.	Bacillary Bact.	Bacillary exudate.	Protozoal.	Clinical.
Waziristan District	1,335	..	..	..	..	..	16·5	1·5	..	13·5
Quetta	1,440	..	..	..	..	0·7	15·3	5·6	2·8	13·9
Baluchistan District	1,440	...	..	..	..	0·7	15·3	5·6	2·8	13·9
Hyderabad	532	..	..	..	..	..	7·5	..	..	15·0
Karachi	1,232	..	..	..	..	..	13·8	5·7	1·6	13·0
Sind Bde. Area	1,764	..	..	..	..	..	11·5	4·0	1·1	13·6
Bareilly	746	..	..	..	..	..	12·1	5·4	4·0	9·4
Chakrata	965	..	..	..	..	1·0	7·3	6·2	2·1	..
Dehra Dun	402	..	..	..	..	7·5	19·9	2·5	7·5	..
Jhansi	1,108	0·9	0·9	..	..	..	13·5	0·9	4·5	1·8
Landour	51	..	..	..	..	..	..	..	19·6	..
Meerut	1,709	..	0·6	0·6	..	0·6	11·1	28·1	1·8	4·1
Roorkee	209	..	..	..	..	..	..	4·8	..	..
Meerut District	5,190	0·2	0·4	0·2	..	1·0	11·2	11·8	3·3	3·1
Allahabad	854	3·5	7·0	..	..	1·2	9·4	2·3	14·1	..
Benares	142	..	..	..	..	..	..	..	..	..
Cawnpore	762	..	..	..	..	..	2·6	2·6	..	3·9
Fyzabad	704	..	..	..	..	7·1	9·9	1·4	..	5·7
Lucknow	2,216	0·5	0·5	..	..	..	21·7	0·5	1·4	1·4
Ranikhet	1,177	..	..	..	..	..	38·2	10·2	3·4	..
Lucknow District	5,855	0·7	1·2	..	...	1·0	18·8	3·1	3·2	1·7
Calcutta	943	..	..	..	..	4·2	15·9	6·4	5·3	5·3
Barrackpore	510	..	2·0	..	..	5·9	5·9	9·8	7·8	5·9
Dinapore	560	..	..	..	..	8·9	12·5	12·5	..	3·6
Lebong	526	..	..	..	..	..	3·8	..	3·8	1·9
Dacca	12	..	..	..	..	..	..	..	..	..
Port Blair	133	...	...	...	...	7·5	...	..	..	..
P. & A. District	2,684	..	0·4	..	..	4·8	10·1	6·7	4·1	4·1
Agra	773	..	..	..	..	1·3	10·3	2·6	1·3	2·6
Delhi	922	4·3	..	..	..	1·1	4·3	11·9	3·3	7·6
Muttra	259	..	..	..	..	..	11·6	..	..	50·2
Delhi Ind. Bde.	1,954	2·0	..	..	...	1·0	7·7	6·7	2·0	11·3
Ahmednagar	922	..	..	..	..	..	9·8	6·5	..	..
Jubbulpore	1,399	..	..	..	..	..	16·4	5·7	6·4	..
Kamptee	764	..	..	..	..	1·3	1·3	2·6	..	..
Secunderabad	2,594	..	..	..	..	..	19·3	2·3	..	1·2
Pachmarhi	58	..	..	..	..	..	..	17·2	..	..
Saugor	21	..	..	..	..	..	..	..	..	..

VIII—*contd.*

Diarrhœa.	Cholera.	Venereal diseases.	Small-pox.	Malaria.	Dengue.	Sandfly fever.	Plague.	Influenza.	Pneumonia (Lobar and Lobular).	Heat-stroke.	Heat-exhaustion	All Causes.	Average annual number constantly sick.
16·5	..	3·7	..	65·2	..	20·2	..	14·2	5·2	..	1·5	597·0	26·07
38·9	..	12·5	..	113·2	..	1·4	..	20·1	3·5	..	..	730·6	31·70
38·9	..	12·5	..	113·2	..	1·4	..	20·1	3·5	..	..	730·6	31·70
30·1	..	30·1	..	163·5	..	18·8	..	..	1·9	..	5·6	614·7	18·08
14·6	..	39·8	..	66·6	14·6	31·7	..	0·8	1·6	..	..	641·2	41·14
19·3	..	36·8	..	95·8	10·2	27·8	..	0·6	1·7	..	1·7	633·2	34·19
30·8	..	24·1	..	44·2	..	5·4	..	26·8	1·3	..	..	735·9	29·73
7·3	..	32·1	..	26·9	..	2·1	..	4·1	2·1	..	..	399·0	20·29
7·9	..	111·9	..	9·9	..	2·5	..	22·4	7·5	..	..	567·2	19·38
22·6	..	12·6	..	67·7	..	18·1	..	1·8	4·5	..	0·9	537·9	21·24
..	..	39·2	..	19·6	..	..	..	39·2	..	..	..	411·8	10·59
31·6	..	39·2	..	62·0	..	2·3	..	15·2	4·7	..	0·6	737·3	43·56
9·6	..	23·9	..	43·1	..	..	..	..	..	..	..	387·6	5·02
22·2	..	35·1	..	48·9	..	6·0	..	12·1	3·7	..	0·4	601·2	28·73
24·6	..	36·3	..	50·4	1·2	7·0	..	8·2	5·9	..	..	545·7	27·03
28·2	..	28·2	..	7·0	190·1	7·0	..	28·2	7·0	..	14·1	936·6	38·66
11·8	..	34·1	..	42·0	14·4	13·1	..	22·3	..	..	..	568·2	19·51
8·5	..	22·7	..	17·0	..	17·0	..	2·8	2·8	1·4	..	318·2	14·33
30·2	..	38·4	0·5	20·8	0·5	28·4	..	7·2	4·1	..	..	523·0	26·80
17·0	..	5·1	..	18·7	..	..	..	37·4	4·2	..	..	449·4	30·18
21·7	..	28·7	0·2	26·6	6·8	15·7	..	15·4	3·8	0·2	0·3	502·8	25·35
9·5	5·3	74·2	..	17·0	38·2	1·1	..	47·7	5·3	..	..	637·3	27·72
7·8	..	141·2	..	2·0	7·8	..	..	9·8	2·0	..	..	496·1	38·55
1·8	..	66·1	..	32·1	..	25·0	..	12·5	..	..	..	458·9	17·70
5·7	..	9·5	..	24·7	..	..	..	116·0	..	..	..	355·5	9·96
..	..	..	..	..	..	..	..	..	..	..	..	83·3	0·83
..	..	7·5	..	30·1	..	30·1	..	..	..	..	..	180·5	7·74
6·3	..	68·9	..	19·4	14·9	7·1	..	44·0	2·2	..	..	492·9	23·10
11·6	..	47·9	..	41·4	3·9	15·5	..	1·3	3·9	1·3	2·6	720·6	30·35
29·3	..	36·9	..	71·6	4·3	27·1	..	75·9	1·1	..	..	790·7	34·23
3·9	..	57·9	..	54·1	..	3·9	..	..	15·4	..	..	930·5	38·73
18·9	..	44·0	..	57·3	3·6	19·4	..	36·3	4·1	0·5	1·0	781·5	33·29
13·0	..	16·3	..	45·6	..	2·2	..	..	..	..	..	282·0	5·66
18·6	..	49·3	..	61·5	..	2·1	..	..	4·3	..	0·7	526·1	24·30
10·5	..	27·5	..	92·9	·2	57·6	..	15·7	5·2	..	..	532·7	15·07
13·5	..	18·9	..	3·1	15·4	39·3	..	..	1·5	..	..	485·0	21·77
17·2	..	..	..	69·0	..	..	..	..	..	..	..	327·6	7·76
..	..	..	..	47·6	..	..	..	..	..	..	..	714·3	11·90

TABLE

Stations and Districts.	Average annual strength.	Enteric group of fevers.					Dysentery.			
		Typhoid fever.	Para A.	Para B.	Para C.	Enteric group.	Bacillary Bact.	Bacillary exudate.	Protozoal.	Clinical.
Deccan District . . .	5,758	...	...	...	...	0·2	14·4	4·0	1 6	0·5
Mhow	1,479	...	...	...	...	1·4	9·5	5·4	1·4	1·4
Mount Abu . . .	73	...	...	...	...	...	13·7	...	...	...
Nasirabad . . .	711	...	...	...	...	...	18·3	4·2	4·2	1·4
Ahmedabad . . .	156	...	...	...	...	...	12·8	25·6	6·4	...
Colaba	740	...	...	...	...	1·4	12·2	9·5	2·7	4·1
Deolali	357	...	...	...	...	...	...	2·8	...	...
Bombay District . .	3,516	...	...	...	...	0·9	11·1	6·5	2·3	1·7
Belgaum	73	...	...	...	...	13·7	...	...	...	...
Poona	2,377	0·4	0·4	...	...	0·8	21·5	13·9	0·8	...
Purandhar . . .	72	...	...	...	...	...	27·8	...	...	...
Poona Bde. Area . .	2,522	0·4	0·4	...	...	1·2	21·0	13·1	0·8	...
Bangalore . . .	1,047	...	...	...	...	...	16·2	5·7	3·8	2·9
Madras	761	...	...	...	...	...	5·3	3·9	1·3	...
Malapurum . . .	134	...	...	...	...	...	...	...	...	...
Wellington . . .	789	...	...	...	...	1·3	1·3	15·2	3·8	...
Madras District . .	2,748	...	...	...	...	0·4	8·0	7·6	2·9	1·1
Mandalay . . .	126	...	...	...	...	7·9	...	7·9	...	...
Maymyo	735	...	...	...	...	4·1	4·1	6·8	2·7	2·7
Mingaladon . . .	894	...	...	...	...	2·2	14·5	3·4	14·5	2·2
Burma District . .	1,755	...	...	...	...	3·4	9·1	5·1	8·5	2·3
INDIA .	52,059	0·3	0·2	0·0	0·0	1·0	11·1	5·8	2·5	4·9

VIII—*concld.*

Diarrhœa.	Cholera.	Venereal diseases.	Small-pox.	Malaria.	Dengue.	Sandfly fever.	Plague.	Influenza.	Pneumonia (Lobar and Lobular).	Heat-stroke.	Heat-exhaustion.	All Causes.	Average annual number constantly sick.
14·2	...	26·7	...	36·8	8·2	26·2	...	2·1	2·4	...	0·2	468·0	18·74
18·3	...	13·5	0·7	81·1	...	...	...	5·4	4·7	...	...	513·9	27·41
41·1	...	27·4	...	54·8	...	...	...	...	...	...	...	424·7	12·60
25·3	...	25·3	...	39·4	...	7·0	...	7·0	...	...	...	544·3	21·21
6·4	...	25·6	...	160·3	25·6	...	...	...	...	...	...	762·8	28·08
10·8	...	77·0	...	27·0	...	...	...	6·8	4·1	...	1·4	697·3	48·86
5·6	...	19·6	...	70·0	...	...	...	14·0	5·6	...	5·6	728·3	22·21
16·8	...	30·7	0·3	63·1	1·1	1·4	...	6·5	3·4	...	0·9	589·6	29·64
...	...	27·4	...	27·4	...	...	...	13·7	13·7	...	...	369·9	9·45
12·2	...	32·4	...	76·6	...	...	...	3·8	0·8	...	...	565·8	39·65
13·9	...	27·8	...	55·6	...	...	...	...	...	...	...	736·1	27·08
11·9	...	32·1	...	74·5	...	...	...	4·0	1·2	...	...	565·0	38·42
1·0	...	70·7	...	10·5	3·8	3·8	...	...	...	...	...	484·2	27·25
9·2	...	114·3	...	21·0	60·4	...	...	...	1·3	...	...	471·7	31·24
7·5	...	126·9	...	...	7·5	...	...	...	...	...	...	522·4	31·04
16·5	...	49·4	...	6·3	..	...	...	1·3	...	...	...	316·9	21·46
8·0	...	79·0	...	11·6	18·6	1·5	...	0·4	0·4	...	...	431·6	26·71
31·7	...	166·7	...	63·5	47·6	...	...	...	...	...	...	1087·3	49·52
5·4	...	46·3	...	85·7	10·9	8·2	...	2·7	...	...	...	598·6	31·67
10·1	...	53·7	...	60·4	23·5	...	...	1·1	4·5	...	...	805·4	30·50
9·7	...	58·7	...	71·2	19·9	3·4	...	1·7	2·3	...	...	739·0	32·36
16·4	0·1	35·1	0·1	57·7	4·7	33·6	...	12·3	3·4	0·2	0·6	580·5	26·93

TABLE IX.

BRITISH OFFICERS (BRITISH SERVICE).

ALL INDIA.

Table showing the Average Strength, Admissions into Hospital, Deaths and Constantly Sick, during the year 1936, with Ratios per 1,000 of the Strength.

Diseases.	Actuals.			Ratio per 1,000.		
	Admissions.	Deaths.	Average number constantly sick.	Admissions.	Deaths.	Constantly sick.
Average strength . . . . . 2,269.						
Specific diseases due to infection or infestation.						
Common cold	12	..	0·20	5·3	..	0·09
Diphtheria	3	..	0·14	1·3	..	0·06
Dysentery	92	..	3·14	40·1	.	1·38
Enteric fever (inclusive of typhoid, para A, B and C, and enteric group).	6	..	0·70	2·6	..	0·31
Erysipelas	1	..	0·02	0·4	..	0·01
Influenza	30	..	0·60	13·2	..	0·26
Malaria	71	..	2·06	31·3	..	0·91
Measles	..	..	..	..	..	..
Meningococcal infection	..	..	..	..	..	..
Mumps	6	..	0·23	2·6	..	0·10
Pneumonia	7	..	0·68	3·1	..	0·30
Pyrexia of uncertain origin	1	..	0·16	0·4	..	0·07
Rheumatic fever	..	..	..	..	..	..
Sandfly fever	64	..	0·97	28·2	..	0·43
Scararlet fever.	..	..	..	..	..	..
Small-pox	1	..	0·05	0·4	..	0·02
Tuberculosis — Pulmonary	2	..	0·12	0·9	..	0·05
Tuberculosis — Other	1	..	0·00	0·4	..	0·00
Venereal diseases — Gonorrhœa	1	..	0·13	0·4	..	0·06
Venereal diseases — Soft chancre	..	..	..	..	..	..
Venereal diseases — Syphilis	..	..	..	..	..	..
Venereal diseases — Other V. D.	..	..	..	..	..	..

Other diseases due to infection	74	..	2·96	32·6	..	1·30
Diseases due to infestation by Metazoan parasites. — Scabies	..	..	..	..	..	..
Diseases due to infestation by Metazoan parasites. — Other diseases	3	..	0·03	1·3	..	0·01
Other diseases classified under systems.						
Diseases of the nervous system	15	..	0·89	6·6	..	0·39
Mental diseases	2	..	0·09	0·9	..	0·04
Diseases of the — Eye	8	..	0·17	3·5	..	0·07
Diseases of the — Ear and nose	35	..	0·74	15·4	..	0·33
Diseases of the circulatory system. — Valvular disease of the heart	2	..	0·06	0·9	..	0·03
Diseases of the circulatory system. — Disordered action of the heart	2	..	0·03	0·9	..	0·01
Diseases of the circulatory system. — Other diseases	4	..	0·65	1·8	..	0·29
Diseases of the blood and blood forming organs	5	..	0·12	2·2	..	0·05
Diseases of ductless or endocrine glands	..	..	..	..	..	..
Diseases of the breast	..	..	..	..	..	..
Diseases of the respiratory system. — Larynx and trachea	1	..	0·04	0·04	..	0·02
Diseases of the respiratory system. — Bronchi and bronchioles	11	..	0·23	4·8	..	0·10
Diseases of the respiratory system. — Other diseases	3	..	0·11	1·3	..	0·05
Diseases of the teeth and gums	7	..	·10	3·1	..	0·04
Diseases of the digestive system. — Inflammation of tonsils	43	..	1·01	19·0	..	0·45
Diseases of the digestive system. — Inflammation of pharynx	12	..	0·21	5·3	..	0·09
Diseases of the digestive system. — Inflammation of stomach	22	..	0·35	9·7	..	0·15
Diseases of the digestive system. — Gastric ulcer	3	..	0·25	1·3	..	0·11
Diseases of the digestive system. — Duodenal ulcer	3	..	0·39	1·3	..	0·17
Diseases of the digestive system. — Liver diseases	2	..	0·12	0·9	..	0·05
Diseases of the digestive system. — Other diseases	155	..	4·70	68·3	..	2·07
Diseases due to disorders of nutrition or of metabolism	3	..	0·36	1·3	..	0·16
Diseases of the generative system	5	..	0·20	2·2	..	0·09
Diseases of bones, joints, muscles, fasciæ and bursæ	21	..	0·69	9·3	..	0·30
Diseases of the areolar tissue	68	..	1·96	30·0	..	0·86
Diseases of the skin	14	..	0·44	6·2	..	0·19
Diseases of the urinary system	15	..	0·47	6·6	..	0·21
Injuries — General	6	5	0·08	2·6	2·20	0·04
Injuries — Local	123	7	4·70	54·2	3·09	2·07
Injuries — In action	..	..	..	..	..	..
Tumours and cysts	6	2	0·17	2·6	0·88	0·07
Poisons	1	..	0·07	0·04	..	0·00
No appreciable disease	1	..	0·01	0·04	..	0·00
Suicided	..	4	..	..	1·76	..
Total	973	14	31·54	428·8	6·17	13·90

The figures against "suicides" having already been shown under the heading of the injury etc. which caused death, are not included in the total.

TABLE X.

WIVES OF WARRANT OFFICERS, N. C. Os. AND MEN.

INDIA.

Table showing the average strength, admissions into hospital, deaths and constantly sick, during the year 1936, with ratios per 1,000 of the strength.

Diseases.	Actuals.			Ratio per 1,000.		
Average strength . . 4,055.	Admissions.	Deaths.	Average number constantly sick.	Admissions.	Deaths.	Constantly sick.
Specific diseases due to infection or infestation.						
Common cold	18	...	0·22	4·4	...	0·05
Diphtheria	6	...	0·47	1·5	...	0·12
Dysentery	48	...	1·69	11·8	...	0·42
Enteric fever (inclusive of typhoid, para A, B and C and enteric group).	2	..	0·38	0·5	...	0·09
Erysipelas	1	...	0·03	0·2	..	0·01
Influenza	14	...	0·25	3·5	...	0·06
Malaria	82	...	2·31	20·2	...	0·57
Measles	2	...	0·09	0·5	...	0·02
Meningococcal infection	...	...	...	...	...	...
Mumps	1	...	0·04	0·2	...	0·01
Pneumonia	10	1	0·69	2·5	0·25	0·17
Pyrexia of uncertain origin	...	...	...	...	...	...
Rheumatic fever	2	...	0·27	0·5	...	0·07
Sandfly fever	12	...	0·17	3·0	...	0·04
Scarlet fever.	...	...	...	...	...	...
Small-pox	...	...	0·14	...	...	0·03
Tuberculosis — Pulmonary	6	...	1·25	1·5	...	0·31
Tuberculosis — Other	2	...	0·04	0·5	...	0·01
Venereal diseases — Gonorrhœa	1	...	0·11	0·2	...	0·03
Venereal diseases — Soft chancre	...	...	...	...	...	...
Venereal diseases — Syphilis	...	...	...	...	...	...
Venereal diseases — Other V. D.	...	...	...	...	...	...
Other diseases due to infection	29	...	0·76	7·2	...	0·19

Diseases due to infestation by metazoan parasites.	Scabies	...	...	...	...	...	...
	Other diseases	18	...	0·24	4·4	...	0·06
Other diseases classified under systems.							
Diseases of the nervous system		28	...	1·10	6·9	...	0·27
Mental diseases		28	...	0·59	6·9	...	0·15
Diseases of the eye		8	...	0·23	2·0	...	0·06
Diseases of the ear and nose		34	...	0·94	8·4	...	0·23
Diseases of the—							
Circulatory system.	Valvular disease of the heart	4	...	0·24	1·0	...	0·06
	Disordered action of the heart	3	...	0·12	0·7	...	0·03
	Other diseases	11	1	0·75	2·7	0·25	0·18
Blood and blood forming organs		22	...	0·76	5·4	...	0·19
Ductless or endocrine glands		9	...	0·37	2·2	...	0·09
Breast		10	...	0·27	2·5	...	0·07
Respiratory system.	Larynx and trachea	4	...	0·09	1·0	...	0·02
	Bronchi and bronchioles	59	...	1·47	14·5	...	0·36
	Other diseases	5	...	0·21	1·2	...	0·05
Teeth and gums		13	...	0·15	3·2	...	0·04
Digestive system.	Inflammation of tonsils	81	1	1·45	20·0	0·25	0·36
	Inflammation of pharynx	8	...	0·14	2·0	...	0·03
	Inflammation of stomach	24	...	0·49	5·9	...	0·12
	Gastric ulcer	2	...	0·15	0·5	...	0·04
	Duodenal ulcer	...	...	...	...	...	...
	Liver	5	...	0·21	1·2	...	0·05
	Other diseases	196	...	6·51	48·3	...	1·61
Diseases due to disorders of nutrition or of metabolism		3	...	0·35	0·7	...	0·09
Diseases of the generative system		337	6	12·96	83·1	1·48	3·20
Diseases of bones, joints, muscles, fasciæ and bursæ		23	...	0·64	5·7	...	0·16
Diseases of the areolar tissue		50	...	1·78	12·3	...	0·44
Diseases of the skin		13	...	0·22	3·2	...	0·05
Diseases of the urinary system		45	1	2·45	11·1	0·25	0·60
Injuries	General	3	2	0·06	0·7	0·49	0·01
	Local	28	...	0·68	6·9	...	0·17
	In action	...	...	...	...	...	...
Tumours and cysts		22	2	1·08	5·4	0·49	0·27
Poisons		...	...	...	...	...	...
No appreciable disease		37	...	0·93	9·1	...	0·28
Suicides		...	1	...	...	0·25	...
	Total	1,369	14	46·54	337·6	3·45	11·48

The figures against "suicides" having already been shown under the heading of the injury, etc., which caused death, are not included to the total..

TABLE XI.

CHILDREN OF WARRANT OFFICERS, N. C. Os. AND MEN.

INDIA.

Table showing the Average Strength, Admissions into Hospital, Deaths, and Constantly Sick, during the year 1936, with Ratios per 1,000 of the Strength.

Diseases.	Actuals			Ratio per 1,000.		
	Admissions.	Deaths	Average number constantly sick.	Admissions.	Deaths.	Constantly sick.
Average strength 6,192						
Specific diseases due to infection or infestation.						
Common cold	39	..	0·60	6·3		0·10
Diphtheria	58	1	4·89	9·4	0·16	0·79
Dysentery	143	16	6·66	23·1	2·58	1·03
Enteric fever (inclusive of typhoid, para. A, B and C and enteric group).	10	..	1·47	1·6	..	0·24
Erysipelas	....	..	....	....	....	....
Influenza	43	..	0·75	6·9	..	0·12
Malaria	89	..	2 58	14·4	..	0·42
Measles	21	..	0 65	3·4	..	0·10
Meningococcal infection	..	..	..	..	..	..
Mumps	6	..	0·14	1·0	..	0·02
Pneumonia	46	10	1·93	7·4	1·61	0·31
Pyrexia of uncertain origin	..	..	..	..	..	..
Rheumatic fever	9	1	0·51	1·5	0·16	0·08
Sandfly fever	14	..	0·19	2·3	..	0·03
Scarlet fever	11	..	0·68	1·8	..	0·11
Smallpox	2	1	0·12	0·3	0·16	0·02
Tuberculosis — Pulmonary	2	2	0·22	0·3	0·30	0·04
Tuberculosis — Other	2	..	0·10	0·3	..	0·02
Venereal diseases — Gonorrhœa	3	..	1·68	0·5	..	0·27
Venereal diseases — Soft chancre	..	..	..	..	..	..
Venereal diseases — Syphilis	..	..	..	..	..	..
Venereal diseases — Other V. D.	..	..	..	..	..	..
Other diseases due to infection	102	3	4·16	16·5	0·48	0·67

Diseases due to infestation by metazoan parasites. — Scabies	1	..	·06	0·2	..	0·01
Diseases due to infestation by metazoan parasites. — Other diseases	55	..	0·81	8·9	..	0·13
Other diseases classified under systems.						
Diseases of the nervous system	19	4	0·76	3·1	0·65	0·12
Mental diseases	...	..	...	...	..	...
Diseases of the—						
Eye	30	..	0·82	4·8	..	0·13
Ear and nose	61	..	2 12	9·9	..	0·34
Circulatory system. — Valvular disease of the heart	1	..	0·16	0·2	..	0·03
Circulatory system. — Disordered action of the heart	3	..	0·16	0·5	...	0·03
Circulatory system. — Other diseases	1	...	0·11	0·2	...	0 02
Blood and blood forming organs	29	..	0·87	4·7	..	0·14
Ductless or endocrine glands	1	..	0·02	0·2	..	0·00
Breast	..	..	..	..	..	..
Respiratory system. — Larynx and trachea	2	..	0·06	0·3	..	0·01
Respiratory system. — Bronchi and bronchioles	149	..	2·84	24·1	..	0·46
Respiratory system. — Other diseases.	3	..	0·31	0·5	...	0·05
Teeth and gums	15	..	0·44	2·4	..	0·07
Digestive system. — Inflammation of tonsils	274	..	4·90	44·3	..	0·79
Digestive system. — Inflammation of pharynx	11	..	0·15	1·8	..	0·02
Digestive system. — Inflammation of stomach	9	6	0·18	1·5	0·97	0·03
Digestive system. — Gastric ulcer	..	..	..	..	..	..
Digestive system. — Duodenal ulcer	..	..	..	..	..	..
Digestive system. — Liver	2	2	0·01	0·3	0·30	0·00
Digestive system. — Other diseases	395	18	8·61	63·8	2·91	1·39
Diseases due to disorders of nutrition or of metabolism	36	6	1·78	5·8	0·97	0·29
Diseases of the—						
Generative system	49	12	0·93	7·9	1·94	0·15
Bones, joints, muscles, fasciæ and bursæ	14	...	0·70	2·3	..	0·11
Areolar tissue	90	..	2·40	14·5	..	0·39
Skin	26	..	0·82	4·2	..	0·13
Urinary system	27	..	1·52	4·4	..	0·25
Injuries — General	2	...	0·02	0·3	...	0·00
Injuries — Local	75	1	2·85	12·1	0·16	0·46
Injuries — In action	..	..	..	..	..	..
Tumours and cysts	3	..	0·08	0·5	..	0·01
Poisons	3	..	0·05	0·5	..	0·01
No appreciable disease	39	..	2·68	6 3	..	0·43
Suicide	..	..	..	..	..	..
Total	2,025	83	64·55	327·0	13·40	10·12

TABLE XII.

BRITISH OTHER RANKS.

Table showing admission and death ratios per 1,000 of Strength by Commands contrasted with the previous year, and the average for the previous five years.

Commands.		Enteric group of fevers.		Influenza.		Cholera.		Small-pox.		Malaria.		Dysentery.	
		A.	D.	A.	D.	A.	D.	A.	D.	A.	D.	A.	D.
Northern Command	1931-35	3·5	0·29	21·0	..	..	..	0·1	..	104·7	0·05	24·2	..
	1935	2·9	0·30	8·0	..	..	..	..	..	57·3	..	28·8	..
	1936	0·9	0·06	13·5	..	..	..	0·1	0·06	78·5	..	20·9	..
Western Command	1931-35	2·8	0·05	28·9	0·10	..	..	..	..	154·8	0·25	39·1	..
	1935	1·3	..	11·3	..	..	..	..	..	136·1	0·51	37·1	..
	1936	0·3	..	9·4	..	..	..	..	..	103·9	0·62	35·3	..
Eastern Command	1931-35	3·1	0·26	18·2	0·02	0·1	..	0·1	..	71·9	0·06	26·2	0·04
	1935	2·3	0·19	11·9	..	0·1	..	0·2	..	44·8	0·13	30·6	0·06
	1936	2·7	0·13	21·6	..	0·3	..	0·1	..	36·8	..	27·7	..
Southern Command	1931-35	1·5	0·12	11·5	0·01	..	..	0·1	..	61·8	0·05	27·2	..
	1935	0·7	0·07	12·6	..	..	..	..	..	48·9	..	25·6	..
	1936	0·7	..	3·2	..	..	..	0·1	..	45·3	0·07	23·4	..
Burma District	1931-35	1·1	..	19·1	..	..	..	..	..	47·8	..	19·2	..
	1935	3·3	..	6·1	..	..	..	..	..	29·2	..	32·0	..
	1936	4·0	..	1·7	..	..	..	..	..	70·7	..	25·1	..
All-India	1931-35	2·7	0·20	18·3	0·02	0·0	..	0·1	..	85·1	0·07	26·6	0·01
	1935	2·0	0·17	10·6	..	0·4	..	0·1	..	56·1	0·08	29·2	0·02
	1936	1·5	0·06	12·4	..	0·1	..	0·2	0·02	58·0	0·06	24·6	..

Commands.		Pyrexia of uncertain origin.		Pneumonia, lobar and lobular.		Venereal diseases.		Dengue.		Sand-fly fever.		Plague.	
		A.	D.	A.	D.	A.	D.		D.	A.	D.	A.	D.
Northern Command	1931-35	2·2	..	5·5	0·48	27·5	..	0·3	..	80·6	..	..	..
	1935	1·0	..	5·2	0·42	27·3	..	..	..	83·1	..	..	..
	1936	0·3	..	5·0	0·59	27·8	..	0·1	..	80·2		..	..
Western Command	1931-35	0·7	..	4·0	0·44	26·3	..	3·7	..	7·4	..	..	..
	1935	..	..	3·3	0·26	22·2	..	..	..	6·4	..	..	..
	1936	..	..	3·1	..	29·4	..	5·6	..	15·9	..	..	..
Eastern Command	1931-35	0·6	..	4·2	0·34	43·8	..	10·4	..	21·7	0·01	..	..
	1935	0·2	..	4·4	0·70	50·8	..	4·6	..	24·3	..	..	..
	1936	0·1	..	3·4	0·45	39·3	..	5·5	..	11·5	..	..	..
Southern Command	1931-35	2·5	..	2·9	0·24	37·0	..	10·9	..	16·8	..	..	..
	1935	1·1	..	3·6	0·14	38·3	..	5·9	..	8·7	..	..	..
	1936	0·1	..	2·1	0·21	35·1	..	7·0	..	11·5	..	..	..
Burma District	1931-35	0·9	..	2·3	0·11	97·6	0·11	63·5	..	1·6	..	..	..
	1935	0·6	..	0·6	..	79·4	0·55	57·4	..	..	..	..	..
	1936	5·7	..	2·3	..	59·8	..	19·9	..	3·4	..	..	..
All India	1931-35	1·7	..	4·1	0·36	37·3	0.00	8·6	..	38·8	..	..	..
	1935	0·7	..	4·2	0·40	38·8	0·02	5·0	..	36·5	..	.	..
	1936	0·2	..	3·5	0·38	34·5	..	4·7	..	38·8	..	.	..

A.—Admissions. D.—Deaths.

TABLE XIII.

VACCINATION PERFORMED IN THE BRITISH AND INDIAN ARMIES DURING 1936—OFFICERS AND OTHER RANKS.

Commands.	British Troops.							
	Officers.				Warrant and N. C. Officers and men.			
	Number.		Percentage of successful cases to total operations.		Number.		Percentage of successful cases to total operations.	
	P.	R.	P.	R.	P.	R.	P.	R.
Northern	2	375	50	86	278	6,324	64	91
Western	23	52	100	85	928	480	100	56
Eastern	..	220	..	79	53	4,628	83	73
Southern	15	184	93	73	340	3,390	23	74
Burma District	..	4	..	50	..	424	..	46
Total	40	835	95	81	1,599	15,246	77	79

Commands.	Indian Troops.											
	European officers.				Indian commissioned, Non-commissioned officers and men.				Followers.			
	Number.		Percentage of successful cases to total operations.		Number.		Percentage of successful cases to total operations.		Number.		Percentage of successful cases to total operations.	
	P.	R.	P.	R.	P.	R.	P.	R.	P.	R.	P.	R.
Northern	..	283	..	85	22	20,631	95	84	24	4,607	100	83
Western	..	59	..	100	..	4,574	..	82	2	1,017	100	85
Eastern	..	132	..	77	306	14,037	100	70	3	1,892	100	70
Southern	..	108	..	66	361	6,459	80	65	16	1,985	100	81
Burma District	..	11	..	9	..	1,089	..	55	..	137	..	65
Total	..	593	..	80	689	46,790	89	76	45	9,638	100	80

P.—Primary. R.—Revaccinations.

TABLE XIV.

VACCINATION PERFORMED IN THE FAMILIES—BRITISH ARMY DURING 1936.

Commands.	Women.				Children.			
	Number.		Percentage of successful cases to total operations.		Number.		Percentage of successfu cases to total operations.	
	P.	R.	P.	R.	P.	R.	P.	R.
Northern . .	..	806	..	90	223	853	100	90
Western . .	..	49	..	78	17	51	100	84
Eastern . .	5	391	..	76	174	490	90	75
Southern . .	66	349	97	73	263	516	98	73
Burma District .	5	18	100	67	24	20	87	80
Total	76	1,613	91	83	701	1,930	96	81

P—Primary. R—Revaccinations.

TABLE XV.

VACCINATION PERFORMED IN THE FAMILIES—INDIAN ARMY DURING 1936.

Commands.	Women.				Children.			
	Number.		Percentage of successful cases to total operations.		Number.		Percentage of successful cases to total operations.	
	P.	R.	P.	R.	P.	R.	P.	R.
Northern . .	..	118	..	81	19	66	100	83
Western . .	..	20	..	100	5	3	100	100
Eastern . .	..	105	..	85	6	93	100	97
Southern . .	..	65	..	63	9	24	100	75
Burma District .	..	3	..	33	2	1	100	..
Total .	..	306	..	79	41	187	100	89

P—Primary. R—Revaccinations.

SECTION II.

INDIAN ARMY, 1936.

TABLE B.

STATIONS BY COMMANDS AND INDEPENDENT DISTRICTS.

Stations.	Height above M. S. level in feet.*	Authority for height.	Points of reference.
Northern Command.			
Abbottabad	4,010	S. D.	Map.
Ambala	902	,,	S.B.M.
Amritsar	754	,,	,,
Bakloh	4,585	,,	Map.
Bannu	1,250	,,	,,
Campbellpore	1,180	,,	,,
Chitral	4,980	,,	,,
Dagshai	6,087	,,	,,
Dalhousie	7,687	,,	,,
Dera Ismail Khan	568	,,	S.B.M.
Dharamsala Cantt.	4,500	,,	Map.
Drosh Fort	4,340	,,	,,
Ferozepore	649	,,	S.B.M.
Jhelum	762	,,	,,
Jullundur Cantt.	771	,,	B.M.
Jutogh	6,370	,,	Map.
Kalabagh and Baragali	7,963	,,	,,
Kalabagh and Mari Indus	682	,,	,,
Kohat	1,725	,,	,,
Kuldana	7,049	S. G.	,,
Lahore Cantonment	706	S.D.	S.B.M.
Landikotal	3,509	,,	Map.
Lockhart Fort	6,613	,,	,,
Malakand	2,740	,,	,,
Manzai	1,650	,,	,,
Mardan	1,000	,,	,,
Mir Ali	2,240	S.G.	V.G.L.
Mona	3,500	S.D.	Map.
Multan	404	,,	S.B.M.
Nowshera (Ry. Station)	966	,,	B.M.
Peshawar	1,152	,,	S.B.M.
Rawalpindi	1,689	,,	,,
Razmak	6,556	,,	Map.
Risalpur	1,014	,,	B.M.
Shagai	3,174	,,	,,
Sargodha (Railway Rest House)	615	,,	,,
Sialkot	829	,,	,,
Solon	5,078	,,	,,
Subathu	4,000	,,	Map.
Thall	2,450	,,	,,
Wana	4,530	,,	V.G.L.
Western Command.			
Chaman Fort	5,502	S.D.	Map.
Fort Sandeman	4,600	,,	,,
Hindubagh	5,821	,,	,,
Hyderabad (Sind)	96	,,	S.B.M.
Karachi (Holy Trinity Church)	28	,,	,,
Loralai	4,699	,,	Map.
Quetta	5,510	,,	S.B.M.
Sibi	436	,,	,,
Eastern Command.			
Agra (Fort)	525	S.D.	S.B.M.
Allpore	17	,,	B.M.
Allahabad	314	,,	S.B.M.
Eastern Command—contd.			
Almora	6,494	S.D.	Map.
Bankura	..	..	..
Bareilly	563	S.D.	S.B.M.
Benares	256	,,	,,
Cawnpore	407	,,	B.M.
Chittagong	..	..	..
Comilla	..	..	..
Dacca	20	M.D.	..
Dehra Dun	2,232	S.D.	S.B.M.
Delhi	757	,,	,,
Dinapore	170	,,	Church.
Fatehgarh	467	,,	,,
Fyzabad	330	,,	S.B.M.
Ghoom	7,313	,,	Jn. of road.
Gyantse	13,120	,,	Map.
Gorakhpore	..	..	..
Jhansi	849	S.D.	S.B.M.
Lansdowne	5,823	,,	Map.
Lucknow	383	,,	B.M.
Meerut	737	,,	S.B.M.
Midnapore	..	..	..
Muttra	560	S.D.	S.B.M.
Mymensingh	..	..	..
Nowgong	735	S.D.	B.M.
Roorkee	879	,,	S.B.M.
Saidpur	..	..	..
Shillong	4,921	S.D.	Map.
Southern Command.			
Ahmedabad	162	S.D.	S.B.M.
Ahmednagar	2,180	,,	Map.
Aurangabad	1,905	M.D.	,,
Bangalore	3,002	S.D.	S.B.M.
Baroda	114	,,	B.M.
Belgaum	2,523	,,	S.B.M.
Bombay (town hall)	20	,,	,,
Cannanore	40	,,	..
Deolali	1,894	,,	S.B.M.
Jubbulpore	1,320	,,	,,
Kamptee (Rly. Station).	940	,,	B.M.
Mhow (Ry. Station)	1,887	,,	..
Mount Abu (Sanitorium)	3,836	,,	..
Neemuch	1,613	,,	..
Nasirabad	1,461	,,	B.M.
Pachmarhi	3,490	,,	,,
Poona	1,867	,,	S.B.M.
Saugor	1,755	,,	,,
St. Thos. Mount (Ry. Station)	34	,,	B.M.
Madras (Obsy.)	250	,,	,,
Trichinopoly	256	,,	S.B.M.
Trimulgherry	1,843	,,	Map.
Wellington Stn. Hospl.	5,800	,,	,,
Burma District.			
Mandalay (Fort Dufferin)	264	S.D.	Map.
Maymyo	3,508	,,	,,
Mingaladon	118	,,	,,

* These heights are usually those of the survey-marks or of the mercury surface in barometer cisterns of meteorological observatories.

S. D. = Survey Department (Map Publication Office).
S. G. = Surveyor-General of India.
S.B.M. = Standard Bench Mark.
B.M. = G. T. Bench Mark.
V.G.L.—Village Ground Level.
Map. = Heights taken from Topo. Maps.
M.D. = Meteorological Department.

TABLE XVI.

INDIAN OFFICERS AND INDIAN OTHER RANKS.

ALL INDIA.

Table showing the average strength, admissions into hospital, deaths, numbers invalided and constantly sick, during the year 1936, with ratios per 1,000 of the strength.

Diseases.	Actuals.				Ratio per 1,000.			
	Admissions.	Deaths.	Invalids.	Average number constantly sick.	Admissions.	Deaths.	Invalids.	Constantly sick.
Average strength, 116,528.								
Specific diseases due to infection or infestation.								
Common cold	1,241	..	..	21·69	10·6	..	..	0·19
Diphtheria	6	..	..	0·54	0·1	..	..	0·00
Dysentery	1,277	4	...	50·02	11·0	0·03	..	0·43
Enteric fevers (inclusive of typhoid, paras. A B & C and enteric group).	78	5	...	11·34	0·7	0·04	..	0·10
Erysipelas	4	..	..	0·21	0·0	..	..	0·00
Influenza	851	1	..	19·66	7·3	0·01	..	0·17
Malaria	14,340	8	...	348·05	123·1	0·07	..	2·99
Measles	156	..	..	6·35	1·3	..	..	0·05
Meningococcal infection	16	4	1	1·51	0·1	0·03	0·01	0·01
Mumps	599	..	1	31·64	5·1	..	0·01	0·27
Pneumonia	624	71	..	48·95	5·4	0·61	..	0·42
Pyrexia of uncertain origin	10	1	..	0·63	0·1	0·01	..	0·01
Rheumatic fever	93	..	8	7·51	0·8	..	0·07	0·06
Sandfly fever	1,236	..	..	21·66	10·6	..	..	0·19
Scarlet fever	...	..	..	...	...	..	..	..
Small-pox	20	..	..	1·75	0·2	..	..	0·02
Tuberculosis — Pulmonary	203	15	193	21·30	1·7	0·13	1·66	0·18
Tuberculosis — Other	30	3	15	4·32	0·3	0·03	0·13	0·04
Venereal Diseases — Gonorrhœa	561	..	1	61·32	4·8	..	0·01	0·53
Venereal Diseases — Soft chancre	181	..	..	15·34	1·6	..	..	0·13
Venereal Diseases — Syphilis	397	..	3	42·00	3·4	..	0·03	0·36
Venereal Diseases — Other VD.	3	..	..	0·17	0·0	..	..	0·00

TABLE XVI—*contd.*

Diseases.	Actuals.				Ratio per 1,000.			
	Admissions.	Deaths.	Invalids.	Average number constantly sick.	Admissions.	Deaths.	Invalids.	Constantly sick.
Other diseases due to infection								
Diseases due to infestation by Metazoan parasites — Scabies	904	16	14	52·35	7·8	0·14	0·12	0·45
Diseases due to infestation by Metazoan parasites — Other diseases	894	..	..	25·78	7·7	..	..	0·22
Other diseases classified under systems.								
Diseases of the nervous system	1,072	..	1	49·91	9·2	..	0·01	0·43
Mental diseases	360	10	33	18·37	3·1	0·09	0·28	0·16
Diseases of the eye	104	3	39	10·20	0·9	0·03	0·33	0·09
Diseases of the ear and nose	1,376	..	42	57·72	11·8	..	0·36	0·50
	1,204	2	9	33·33	10·3	0·02	0·08	0·29
Diseases of the circulatory system. — Valvular disease of the heart	9	2	5	1·22	0·1	0·02	0·04	0·01
Diseases of the circulatory system. — Disordered action of the heart	50	4	7	2·84	0·4	0·03	0 06	0·02
Diseases of the circulatory system. — Other diseases	55	9	9	3·99	0·5	0·08	0·08	0·03
Diseases of blood and blood forming organs	386	5	15	25·90	3·3	0·04	0·13	0·22
Diseases of ductless or endocrine glands.	16	..	3	1·19	0·1	..	0·03	0·01
Diseases of the breast	..	..	..	..	...	..	..	...
Diseases of the respiratory system. — Larynx and trachea	106	..	..	3·28	0·9	..	..	0·03
Diseases of the respiratory system. — Bronchi & bronchioles	1,386	1	10	45·78	11·9	0·01	0·09	0·39
Diseases of the respiratory system. — Other diseases	232	4	21	20·30	2·0	0·03	0·18	0·17
Diseases of the teeth and gums	290	..	...	7·56	2·5	..	..	0·06
Diseases of the digestive system. — Inflammation of the tonsils	690	..	...	17·35	5·9	..	..	0·15
Diseases of the digestive system. — Inflammation of pharynx	2,329	..	..	44·82	20·0	..	..	0·38
Diseases of the digestive system. — Inflammation of stomach	146	...	1	5·72	1·3	...	0·01	0·05
Diseases of the digestive system. — Gastric ulcer	10	...	1	0·66	0·1	...	0·01	0·01
Diseases of the digestive system. — Duodenal ulcer	9	2	..	1·04	0·1	0·02	..	0·01
Diseases of the digestive system. — Liver diseases	123	1	1	7·57	1·1	0·01	0·01	0·06
Diseases of the digestive system. — Other diseases	2,479	12	15	84·99	21·3	0·10	0·13	0·73
Diseases due to disorders of nutrition or of metabolism	51	...	...	3·00	0·4	..	...	0·03
Diseases of the generative system	517	..	2	15·12	4·4	..	0·02	0·13
Diseases of bones, joints, muscles, fasciæ and bursæ	1,037	3	53	48·62	8·9	0·03	0·45	0·42
Diseases of the areolar tissue	3,586	...	2	120·60	30·8	..	0·02	1·03
Diseases of the skin	1,579	...	4	65·25	13·6	...	0·03	0·56
Diseases of the urinary system	322	8	8	17·06	2·8	0·08	0·07	0·15

Injuries — General	40	14	..	1·06	0·3	0·12	..	0·01
Injuries — Local	6,125	41	115	272·96	52·6	0·35	0·99	2·34
Injuries — Inaction	8	...	4	1·78	0·1	...	0·03	0·02
Tumours and cysts	182	5	7	10·36	1·6	0·04	0·06	0·09
Poisons	24	3	..	1·24	0·2	0·03	..	0·01
No appreciable disease	76	..	..	3·03	0·7	...	..	0·03
Suicides*	1	10		0·00	0 0	0·09	..	0·00
Total	49,703	252	643	1,798·00	426·5	2·16	5·52	15·43

* The figures against "Suicides" having already been shown under the heading of the injury, etc., which caused death, are not included in the total.

TABLE XVII.

INDIAN OFFICERS AND INDIAN OTHER RANKS—*contd.*

NORTHERN COMMAND.

Table showing the average strength, admissions into hospital, deaths, numbers invalided and constantly sick, during the year 1936, with ratios per 1,000 of the strength.

Diseases.	Actuals.				Ratio per 1,000.			
Average strength, 56,336.	Admissions.	Deaths.	Invalids.	Average number constantly sick.	Admissions.	Deaths.	Invalids.	Constantly sick.
Specific Diseases due to infection or infestation.								
Common cold	511	...	...	8·99	9·1	...	...	0·16
Diphtheria	1	...	...	0·08	0·0	...	...	0·00
Dysentery	544	3	...	21·61	9·7	0·05	...	0·38
Enteric fever (inclusive of typhoid, para A, B & C, and enteric group).	27	1	...	4·55	0·5	0·02	...	0·08
Erysipelas	4	...	...	0·21	0·1	...	...	0·00
Influenza	386	1	...	9·25	6·9	0·02	...	0·16
Malaria	7,864	3	...	171·44	139·6	0·05	...	3·04
Measles	114	...	...	4·06	2·0	...	...	0·07
Meningococcal infection	11	4	...	0·73	0·2	0·07	...	0·01
Mumps	286	...	1	15·67	5·1	...	0·02	0·28
Pneumonia	357	44	...	26·76	6·3	0·78	...	0·47
Pyrexia of uncertain origin	5	1	...	0·53	0·1	0·02	...	0·01
Rheumatic fever	41	...	6	3·51	0·7	...	0·11	0·06
Sandfly fever	1,041	...	...	18·23	18·5	...	...	0·32
Scarlet fever.	...	...	...	...	...	...	...	...
Small-pox	7	...	...	0·63	0·1	...	...	0·01
Tuberculosis — Pulmonary	114	10	98	9·93	2·0	0·18	1·74	0·18
Tuberculosis — Other	17	2	7	2·57	0·3	0·04	0·12	0·05
Venereal diseases — Gonorrhœa	183	...	1	17·82	3·2	...	0·02	0·32
Venereal diseases — Soft chancre	67	...	...	6·41	1·2	...	...	0·11
Venereal diseases — Syphilis	120	...	2	11·34	2·1	...	0·04	0·20
Venereal diseases — Other V. D.	2	...	...	0·12	0·0	...	...	0·00

Other diseases due to infection	259	5	8	19·55	4·6	0·09	0·14	0·35
Diseases due to infestation by Metazoan parasites — Scabies	349	...	...	9·59	6·2	...	...	0·17
Diseases due to infestation by Metazoan parasites — Other diseases	403	...	...	21·27	7·2	...	...	0 38
Other Diseases classified under systems.								
Diseases of the nervous system	170	8	21	8·32	3·0	0·14	0·37	0·14
Mental diseases	41	1	16	4·23	0·7	0·02	0·28	0·08
Diseases of the — Eye	590	...	24	24·71	10·5	...	0·43	0·44
Diseases of the — Ear and nose	449	1	2	13·68	8·0	0·02	0·04	0·24
Diseases of the circulatory system — Valvular diseases of the heart	2	1	1	0·60	0·0	0·0	0·02	0·01
Diseases of the circulatory system — Disordered action of the heart	24	1	6	1·26	0·4	0·02	0·11	0·09
Diseases of the circulatory system — Other diseases	25	4	3	1·83	0·4	0·07	0·05	0·03
Blood and blood forming organs	148	3	5	8·49	2·6	0·05	0·09	0·15
Diseases of ductless or endocrine glands	6	...	1	0·55	0·1	...	0·02	0·01
Diseases of the breast	...	...	...	...	...	...	...	...
Diseases of the respiratory system — Larynx and trachea	54	...	...	1·80	1·0	...	...	0·03
Diseases of the respiratory system — Bronchi and bronchioles	573	...	2	18·29	10·2	...	0·04	0·32
Diseases of the respiratory system — Other diseases	106	3	15	9·17	1·9	0·05	0·27	0·16
Diseases of the teeth and gums	151	...	...	3·78	2·7	...	...	0·07
Diseases of the digestive system — Inflammation of tonsils	339	...	...	8·61	6·0	...	...	0·15
Diseases of the digestive system — Inflammation of pharynx	1,395	...	...	26·24	24·8	...	...	0·47
Diseases of the digestive system — Inflammation of stomach	35	...	...	1·55	0·6	...	...	0·03
Diseases of the digestive system — Gastric ulcer	2	...	...	0·18	0·0	...	...	0·00
Diseases of the digestive system — Duodenal ulcer	1	1	...	0·05	0·0	0·02	...	0·00
Diseases of the digestive system — Liver diseases	40	...	1	2·37	0·7	...	0·02	0·04
Diseases of the digestive system — Other diseases	1,221	7	11	40·13	21·7	0·12	0·20	0·71
Diseases due to disorders of nutrition or of metabolism	3	...	...	0·26	0·1	...	...	0·00
Diseases of the generative system	112	...	...	4·94	2·0	...	...	0·09
Diseases of bones, joints, muscles, fasciæ and bursæ	424	1	22	19·68	7·5	0·02	0·39	0·35
Diseases of the areolar tissue	1,575	...	1	54·47	28·0	...	0·02	0·97
Diseases of the skin	695	...	1	28·90	12·3	...	0·02	0·51
Diseases of the urinary system	148	2	4	8·20	2·6	0·04	0·07	0·15
Injuries — General	20	8	...	0·45	0·4	0·14	...	0·01
Injuries — Local	2,888	20	55	125·10	51·3	0·35	0·98	2·22
Injuries — In action	8	...	4	1·78	0·1	...	0·07	0·03
Tumours and cysts	88	1	3	4·38	1·5	0·02	0·05	0·08
Poisons	11	...	...	0·53	0·2	...	...	0·01
No appreciable disease	†28	...	...	1·29	0·5	...	...	0·02
Suicides*	1	2	...	0·01	0·0	0·04	...	0·00
Total	24,080	136	321	810·57	427·4	2·41	5·70	14·39

* The figures against "Suicides" having already been shown under the heading of the injury, etc., which caused death, are not included in the total.
† Includes 4 cases of paratyphoid and dysentery carriers.

TABLE XVIII.

INDIAN OFFICERS AND INDIAN OTHER RANKS—*contd.*

WESTERN COMMAND.

Table showing the average strength, admissions into hospital, deaths, numbers invalided and constantly sick, during the year 1936, with ratios per 1,000 of the strength.

Diseases.	Actuals.				Ratio per 1,000.			
Average strength, 12,485.	Admissions.	Deaths.	Invalids.	Average number constantly sick.	Admissions.	Deaths.	Invalids.	Average numbers constanly sick.
Specific Diseases due to infection or infestation.								
Common cold	313	..	..	5·56	25·1	..	..	0·45
Diphtheria	..	..	..	..	..	..	..	..
Dysentery	91	..	..	3·80	7·3	..	..	0·30
Enteric fever (inclusive of typhoid, para. A, B & C and enteric group).	8	1	..	1·15	0·6	0·08	..	0·09
Erysipelas	..	..	..	..	..	..	..	..
Influenza	83	..	..	1·78	6·6	..	..	0·14
Malaria	..	..	..	..	..	..	..	..
Measles	1,603	1	..	45·34	128·4	0·08	..	3·63
Meningococcal infection	9	..	..	0·42	0·7	..	..	0·03
Mumps	3	..	..	0·46	0·2	..	..	0·04
Pneumonia	123	..	..	5·65	9·9	..	..	0·45
Pyrexia of uncertain origin	64	5	..	6.25	5·1	0·40	..	0·50
Rheumatic fever	..	..	..	..	..	..	..	..
Sandfly fever	12	..	..	0·76	1·0	..	..	0·06
Scarlet fever	64	..	...	0·96	5·1	..	..	0·08
Small-pox	..	..	..	..	..	..	..	..
Tuberculosis { Pulmonary	2	..	..	0·18	0·2	..	..	0·01
Tuberculosis { Other	18	3	19	3·17	1·4	0·24	1·52	0·25
Venereal diseases { Gonorrhoea	4	..	2	0·81	0·3	..	0·16	0·06
Venereal diseases { Soft chancre	26	..	..	2·17	2·1	..	..	0·17
Venereal diseases { Syphilis	9	..	..	0·77	0·7	..	..	0·06
Venereal diseases { Other V. D.	18	..	..	1 79	1·4	..	..	0·14
Other diseases due to infection	..	..	..	..	..	..	..	..
Diseases due to infestation by Metazoan parasites { Scabies	71	..	..	4·76	5·7	..	..	0·38
Diseases due to infestation by Metazoan parasites { Other diseases	28	..	..	0·88	2·2	..	..	0·07
	194	..	..	7·03	15·5	..	..	0·56

Other diseases classified under systems.

Diseases of the nervous system		29	..	..	1·34	2·3	..	...	0·11
Mental diseases		17	..	5	1·63	1·4	..	0·40	0·13
Diseases of the eye		92	..	4	4·77	7·4	..	0·32	0·38
Diseases of the ear and nose		63	..	1	1·75	5·0	..	0·08	0·14
Diseases of the circulatory system.	Valvular diseases of the heart	2	..	2	0·18	0·2	..	0·16	0·01
	Disordered action of the heart	10	..	1	1·06	0·8	..	0·08	0·08
	Other diseases	4	1	1	0·41	0·3	0·08	0·08	0·03
Diseases of the blood and blood forming organs		53	..	..	3·03	4·2	..	..	0·24
Diseases of the ductless or endocrine glands		2	..	1	0·29	0·2	..	0·08	0·02
Diseases of the breast		..	..	..	..	..	..	..	..
Diseases of the respiratory system.	Larynx and trachea	15	..	..	0·34	1·2	..	..	0·03
	Bronchi and bronchioles	148	1	1	6·21	11·9	0·08	0·08	0·50
	Other diseases.	29	1	1	2·48	2·3	0·08	0·08	0·20
Diseases of the teeth and gums		15	..	..	0·48	1·2	..	..	0·04
Diseases of the digestive system.	Inflammation of tonsils	50	..	..	1·36	4·0	..	..	0·11
	Inflammation of pharynx	212	..	..	4·09	17·0	..	..	0·33
	Inflammation of stomach	9	..	..	0·29	0·7	..	..	0·02
	Gastric ulcer	..	..	..	..	..	..	..	..
	Duodenal ulcer	..	..	..	..	..	..	..	..
	Liver diseases	9	..	..	0·68	0·7	..	..	0·65
	Other diseases	210	..	1	7·71	16·8	..	0·08	0·62
Diseases due to disorders of nutrition or of metabolism		1	..	..	0·09	0·1	..	..	0·01
Diseases of the generative system		19	..	1	0·71	1·5	..	0·08	0·06
Diseases of bones, joints, muscles, fasciæ, and bursæ		108	..	4	5·03	8·7	..	0·32	0·40
Diseases of the areolar tissue		213	..	..	7·14	17·1	..	..	0·57
Diseases of the skin		145	..	..	5·83	11·6	..	..	0·47
Diseases of the urinary system		41	..	1	2·60	3·3	..	0·08	0·21
Injuries	General	...	...	...	...	...	...	...	...
	Local	501	9	10	23·93	40·1	0·72	0·80	1·92
	In action	..	..	..	..	..	..	..	..
Tumours and cysts		12	..	1	0·51	1·0	..	0·08	0·04
Poisons		4	..	..	0·24	1·3	..	..	0·02
No appreciable disease		†13	..	..	0·85	1.0	..	..	0·07
Suicides*		1	1	..	0·0	0·10	0·08	..	..
	Total	4,769	22	56	178·72	382·0	1·76	4·49	14·31

* The figures against "suicides" having already been shown under the heading of the injury, etc, which caused death, are not included in the total.
† Includes 2 cases of malformations and 1 case of parasites.

TABLE XIX.

INDIAN OFFICERS AND INDIAN OTHER RANKS.

EASTERN COMMAND.

Table showing the average strength, admissions into hospital, deaths, numbers invalided and constantly sick, during the year 1936, with ratios per 1,000 of the Strength.

Diseases.	Actuals.				Ratio per 1,000.			
Average strength, 23,914.	Admissions.	Deaths.	Invalids.	Average number constantly sick.	Admissions.	Deaths.	Invalids.	Constantly sick.
Specific diseases due to infection or infestation.								
Common cold	304	...	...	5·30	12·7	...	...	0·22
Diphtheria	...	...	...	...	...	...	...	...
Dysentery	271	1	...	10·59	11·3	0·04	...	0·44
Enteric fever (inclusive of typhoid, para. A, B & C. and enteric group)	21	...	...	2·95	0·9	...	...	0·12
Erysipelas	...	...	...	...	...	...	...	...
Influenza	116	...	...	2·52	4·9	...	...	0·11
Malaria	2,794	3	...	80·81	116·8	0·13	...	3·38
Measles	9	...	...	0·67	0·4	...	...	0·03
Meningococcal infection	1	...	...	0·09	0·04	...	...	0·00
Mumps	131	...	...	7·04	5·5	...	...	0·20
Pneumonia	136	16	...	10·61	5·7	0·67	...	0·44
Pyrexia of uncertain origin	...	...	...	...	...	...	...	...
Rheumatic fever	16	...	1	1·05	0·7	...	0·04	0·04
Sandfly fever	87	...	...	1·57	3·6	...	...	0·07
Scarlet fever	...	...	...	...	...	...	...	...
Small-pox	10	...	...	0·88	0·4	...	...	0·04
Tuberculosis — Pulmonary	48	...	49	5·77	2·0	...	2·05	0·24
Tuberculosis — Other	5	...	5	0·69	0·2	...	0·21	0·03
Venereal diseases — Gonorrhœa	163	...	...	17·01	6·8	...	...	0·71
Venereal diseases — Soft chancre	45	...	...	3·30	1·9	...	...	0·14
Venereal diseases — Syphilis	121	...	...	13·01	5·1	...	...	0·54
Venereal diseases — Other V. D.	1	...	...	0·05	0·04	...	...	0·00

Other diseases due to infection	165	8	2	12·35	6·9	0·33	0·08	0·62
Diseases due to infestation by Metazoan parasites — Scabies	221	...	...	7·22	9·2	...	...	0·30
Diseases due to infestation by Metazoan parasites — Other diseases	180	...	...	8·35	7·5	...	...	0·35
Other diseases classified under systems.								
Diseases of the nervous system	70	2	...	2·81	2·9	0·08	...	0·12
Mental diseases	22	1	7	2·01	0·9	0·04	0·29	0·08
Diseases of the eye	391	...	7	16·08	16·4	...	0·29	0·67
Diseases of the ear and nose	285	1	3	7·91	11·9	0·04	0·13	0·33
Diseases of the Circulatory system — Valvular disease of the heart	3	1	1	0·36	0·1	0·04	0·04	0·02
Diseases of the Circulatory system — Disordered action of the heart	9	1	...	0·17	0·4	0·04	...	0·01
Diseases of the Circulatory system — Other diseases	12	...	1	1·00	0·5	...	0·04	0·04
Blood and blood forming organs	83	1	5	5·39	3·5	0·04	0·21	0·23
Diseases of ductless or endocrine glands	6	...	1	0·21	0·3	...	0·04	0·01
Diseases of the breast	...	...	...	...	...	...	...	...
Diseases of the respiratory system — Larynx and trachea	22	...	...	0·60	0·9	...	...	0·03
Diseases of the respiratory system — Bronchi and bronchioles.	324	...	3	10·29	13 5	...	0·13	0·43
Diseases of the respiratory system — Other diseases	47	...	1	4·34	2 0	...	0·04	0·18
Diseases of the teeth and gums	51	...	...	1·36	2·1	...	...	0·06
Diseases of the digestive system — Inflammation of tonsils	159	...	...	3·61	6·6	...	...	0·16
Diseases of the digestive system — Inflammation of pharynx	269	...	...	5·30	11·2	...	...	0·22
Diseases of the digestive system — Inflammation of stomach	46	...	...	1·53	1·9	...	...	0·06
Diseases of the digestive system — Gastric ulcer	2	...	...	0·16	0·1	...	...	0·01
Diseases of the digestive system — Duodenal ulcer	6	...	...	0·74	0·3	...	...	0·03
Diseases of the digestive system — Liver	37	1	...	2·08	1·5	0·04	...	0·09
Diseases of the digestive system — Other diseases	493	2	...	16·78	20·6	0·08	...	0·70
Diseases due to disorders of nutrition or of metabolism	4	...	...	0·36	0·2	...	...	0·02
Diseases of the generative system	69	...	...	3·22	2·9	...	...	0·13
Diseases of bones, joints, muscles, fasciæ and bursae	205	...	12	10·59	8·6	...	0·50	0·44
Diseases of the areolar tissue	826	...	...	28·14	34·5	...	...	1·18
Diseases of the skin	327	...	...	15·37	13·7	...	...	0·64
Diseases of the urinary system	68	...	2	3·62	2·8	...	0·08	0·15
Injuries — General	10	3	...	0·29	0·4	0·13	...	0·01
Injuries — Local	1,236	8	16	57·01	51·7	0·33	0·67	2·38
Injuries — In action	...	...	...	...	...	...	...	...
Tumours and cysts	33	3	2	2·24	1·4	0·13	0·08	0·09
Poisons	4	2	...	0·08	0·2	0·08	...	0·00
No appreciable disease	†14	...	...	0·64	0·6	...	...	0·02
Suicides*	...	4	...	...	...	0·16	...	...
Total	9,978	54	118	396·31	417·2	2·26	4·93	16·57

* The figures against "Suicides" having already been shown under the heading of the injury, etc., which caused death, are not included in the total.

† Includes 2 admissions of Malformations.

TABLE XX.

INDIAN OFFICERS AND INDIAN OTHER RANKS—*contd.*

SOUTHERN COMMAND.

Table showing the average strength, admissions into hospital, deaths, numbers invalided and constantly sick, during the year 1936, with ratios per 1,000 of the strength.

Diseases.	Actuals.				Ratio per 1,000.			
Average strength, 20,963.	Admissions.	Deaths.	Invalids.	Average number constantly sick.	Admissions.	Deaths.	Invalids.	Constantly sick.
Specific diseases due to infection or infestation.								
Common cold	101	...	...	1·56	4·8	...	...	0·07
Diphtheria	4	...	...	0·42	0·2	...	...	0·02
Dysentery	312	...	...	11·59	14·9	...	...	0·55
Enteric fever (inclusive of typhoid, para. A, B & C, and enteric group)	21	3	...	2·55	1·0	0·14	...	0·12
Erysipelas	...	...	...	...	...	...	...	...
Influenza	228	...	...	5·42	10·9	...	...	0·26
Malaria	1,653	...	...	39·60	78·9	...	...	1·89
Measles	11	...	...	0·62	0·5	...	...	0·03
Meningococcal infection	1	...	1	0·23	0·05	...	0·05	0·01
Mumps	55	...	...	2·99	2·6	...	...	0·14
Pneumonia	61	5	...	4·80	2·9	0·24	...	0·23
Pyrexia of uncertain origin	5	...	...	0·10	0·2	...	...	0·00
Rheumatic fever	24	...	1	2·19	1·1	...	0·05	0·10
Sandfly fever	44	...	...	0·90	2·1	...	...	0·04
Scarlet fever	..	...	...	...	...	...	...	...
Small-pox	1	...	...	0·06	0·05	...	...	0·00
Tuberculosis — Pulmonary	20	...	23	2·08	1·0	...	1·10	0·10
Tuberculosis — Other	3	...	1	0·22	0·1	...	0·05	0·01
Venereal diseases — Gonorrhœa	85	...	...	7·83	4·1	...	...	0·37
Venereal diseases — Soft chancre	23	...	...	1·98	1·1	...	...	0·09
Venereal diseases — Syphilis	90	...	1	9·56	4·3	...	0·05	0·46
Venereal diseases — Other V. D.	10	...	...	0·74	0·5	...	...	0·04

Other diseases due to infection	322	3	4	13·02	15·4	0·14	0·19	0·62
Diseases due to infestation by Metazoan parasities. — Scabies	223	...	...	7·44	10·6	...	...	0·35
Diseases due to infestation by Metazoan parasities. — Other diseases	240	...	1	11·34	11·4	...	0·05	0·54
Other diseases classified under systems.								
Diseases of the nervous system	80	...	9	5·14	3·8	...	0·43	0·25
Mental diseases	17	1	8	1·57	0·8	0·05	0·38	0·07
Diseases of the eye	247	...	5	9·85	11·8	...	0·24	0·47
Diseases of the ear and nose	280	...	3	7·80	13·4	...	0·14	0·37
Diseases of the circulatory system. — Valvular disease of the heart	2	...	1	0·08	0·1	...	0·05	0·00
Diseases of the circulatory system. — Disordered action of the heart	3	2	...	0·19	0·1	0·10	...	0·01
Diseases of the circulatory system. — Other diseases	11	3	4	0·65	0·5	0·14	0·19	0·03
Diseases of the blood and blood forming organs	72	1	4	5·40	3·4	0·05	0·19	0·26
Diseases of ductless or endocrine glands	2	...	...	0·14	0·1	...	...	0·7
Diseases of the breast	...	...	...	...	...	...	...	...
Diseases of the respiratory system. — Larynx and trachea	9	...	...	0·32	0·4	...	...	0·02
Diseases of the respiratory system. — Bronchi and bronchioles	277	...	3	9·21	13·2	...	0·14	0·44
Diseases of the respiratory system. — Other diseases	43	...	2	3·10	2·1	...	0·10	0·15
Diseases of the teeth and gums	55	...	...	1·56	2·6	...	...	0·07
Diseases of the digestive system. — Inflammation of tonsils	134	...	...	3·42	6·4	...	...	0·16
Diseases of the digestive system. — Inflammation of pharynx	307	...	...	6·55	14·6	...	...	0·31
Diseases of the digestive system. — Inflammation of stomach	53	...	1	2·28	2·5	...	0·05	0·11
Diseases of the digestive system. — Gastric ulcer	6	...	1	0.32	0·3	...	0·05	0·02
Diseases of the digestive system. — Duodenal ulcer	2	1	...	0·25	0·1	0·05	...	0·01
Diseases of the digestive system. — Liver diseases	29	...	...	1·62	1·4	...	...	0·08
Diseases of the digestive system. — Other diseases	416	2	2	16·25	19·8	0·10	0·10	0·78
Diseases due to disorders of nutrition or of metabolism	3	...	1	0·27	0·1	...	0·05	0·01
Diseases of the generative system	60	...	...	2·56	2·9	...	...	0·12
Diseases of bones, joints, muscles, fasciæ and bursæ	243	...	11	10·66	11·6	...	0·52	0·51
Diseases of the areolar tissue	774	...	1	25·14	36·9	...	0·05	1·20
Diseases of the skin	272	...	3	10·89	13·0	...	0·14	0·52
Diseases of the urinary system	60	1	1	2·46	2·9	0·05	0·05	0·12
Injuries — *General*	6	1	...	0·15	0·3	0·05	...	0·01
Injuries — *Local*	1,253	3	30	58·03	59·8	0·14	1·43	2·77
Injuries — In action	...	...	...	...	...	...	...	...
Tumours and cysts	35	1	...	1·77	1·7	0·05	...	0·08
Poisons	5	1	...	0·39	0·2	0·05	...	0·02
No appreciable disease	†23	...	1	1·10	1·1	...	0·05	0·05
Suicides*	...	3	...	...	...	0·14	...	...
Total	8,316	28	123	316·36	396·7	1·34	5·87	15·09

* The figures against "Suicides" having already been shown under the heading of the injury, etc., which caused death, are not included in the total.
† Includes 7 admissions of Carriers and 4 admissions of Malformations.

TABLE XXI.

INDIAN OFFICERS AND INDIAN OTHER RANKS—*contd.*

BURMA DISTRICT.

Table showing the average strength, admissions into hospital, deaths, numbers invalided and constantly sick during the year 1936, with ratios per 1,000 of the strength.

Diseases. Average strength, 2,827.	Actuals.				Ratio per 1,000.			
	Admissions.	Deaths.	Invalids.	Average number constantly sick.	Admissions.	Deaths.	Invalids.	Constantly sick.
Specific diseases due to infection or infestation.								
Common cold	12	...	...	0·28	4·2	...	...	0·10
Diphtheria	1	...	...	0·04	0·4	...	...	0·01
Dysentery	59	...	...	2·43	20·9	...	...	0·86
Enteric fever (inclusive of typhoid, para. A, B, & C, and enteric group).	1	...	...	0·14	0·4	...	...	0·05
Erysipelas	...	...	...	...	...	...	...	...
Influenza	38	...	...	0·69	13·4	...	...	0·24
Malaria	426	1	...	10·86	150·7	0·35	...	3·84
Measles	13	...	...	0·58	4·6	...	...	0·21
Meningococcal infection	...	...	...	...	...	...	...	...
Mumps	4	...	...	0·29	1·4	...	...	0·10
Pneumonia	6	1	...	0·53	2·1	0·35	...	0·19
Pyrexia of uncertain origin	...	...	...	...	...	...	...	...
Rheumatic fever	...	...	...	...	...	...	...	...
Sandfly fever	...	...	...	...	...	...	...	...
Scarlet fever	...	...	...	...	...	...	...	...
Small-pox	...	...	...	...	...	...	...	...

Tuberculosis	Pulmonary	3	...	4	0·35	1·1	...	1·4	0·12
	Other	1	1	...	0·03	0·4	0·35	...	0·01
Venereal diseases	Gonorrhœa	104	...	...	16·49	36·8	...	...	5·88
	Soft chancre	30	...	...	2·32	10·6	...	...	0·52
	Syphilis	45	1	...	6·04	15·9	...	...	2·14
	Other V. D.	...	...	...	...	...	...	...	...
Other diseases due to infection		91	2	...	2·95	32·2	0·71	...	1·04
Diseases due to infestation by Metazoan parasites.	Scabies	73	...	...	0·65	25·8	...	...	0·23
	Other diseases.	51	...	...	1·72	18·0	...	...	0·61
Other diseases classified under systems.									
Diseases of the nervous system		11	...	3	0·86	3·9	...	1·06	0·30
Mental diseases		7	...	3	0·76	2·5	...	1·06	0·27
Diseases of the Eye		56	...	2	2·21	19·8	...	0·71	0·82
Ear and nose		127	...	...	2·19	44·9	...	...	0·77
Circulatory system.	Valvular diseases of the heart	...	...	...	...	...	...	...	...
	Disordered action of the heart	3	...	...	0·08	1·1	...	...	0·03
	Other diseases.	4	1	...	0·18	1·4	0·35	...	0·06
Blood and blood forming organs		30	...	1	3·59	10·6	...	0·35	1·27
Ductless or endocrine glands		...	...	...	...	...	...	...	...
Breast		...	...	...	...	...	...	...	...
Respiratory system.	Larynx and trachea	7	...	...	0·24	2·5	...	...	0·08
	Bronchi and bronchioles	62	...	1	1·65	21·9		0·35	0·58
	Other diseases	8	...	2	1·82	2·8	...	0·71	0·47
Teeth and gums		18	...	...	0·38	6·4	...	...	0·13
Diseases of the digestive system.	Inflammation of the tonsils	8	...	...	0·15	2·8	...	...	0·05
	Inflammation of pharynx.	146	...	...	2·64	51·6	...	...	0·98
	Inflammation of stomach	13	...	...	0·07	1·1	...	...	0·02
	Gastric ulcer	...	...	...	...	...	...	...	...
	Duodenal ulcer	...	...	...	...	...	...	...	...
	Liver	8	...	...	0·82	2·8	...	...	0·29
	Other diseases	139	1	1	4·12	49·2	0·35	0·35	1·46
Diseases due to disorders of nutrition or of metabolism		265	...	...	4·25	93·7	...	...	1·59
Diseases of the generative system		32	...	...	1·46	11·3	...	...	0·52
Diseases of the bones, joints, muscles, fasciae and bursae		57	2	4	2·60	20·2	0·71	1·4	0·91

TABLE XXI—*contd.*

BURMA DISTRICT—*contd.*

Table showing the average strength, admissions into hospital, deaths, numbers invalided and constantly sick, during the year 1936, with ratios per 1,000 of the strength—contd.

Diseases.	Actuals.				Ratio per 1,000.			
	Admissions.	Deaths.	Invalids.	Average number constantly sick.	Admissions.	Deaths.	Invalids.	Constantly sick.
Average strength, 2,827.								
Other diseases classified under systems—contd.								
Diseases of the :—								
Areolar tissue	198	...	...	5·71	70·0	...	...	2·02
Skin	140	...	...	4·26	49·5	...	...	1·51
Urinary system	5	...	...	0·18	1·8	...	...	0·06
Injuries—General	4	2	...	0·17	1·4	0·71	...	0·06
Injuries—Local	247	1	4	8·89	87·4	0·35	1·41	3·14
Injuries—In action	...	...	...	...	...	...	...	...
Tumours and cysts	10	...	...	0·57	3·5	...	...	0·20
Poisons	...	...	...	...	...	...	...	...
No appreciable disease	7	...	...	0·14	2·5	...	...	0·05
Suicides*	...	...	...	...	...	...	...	...
Total	2,560	12	25	96·04	905·6	4·24	8·84	33·79

* The figures against "Suicides" having already been shown under the heading of the injury, etc., which caused death, are not included in the total.

TABLE XXII.

INDIAN OFFICERS AND INDIAN OTHER RANKS—*contd.*

Table showing monthly ratios per 1,000 of strength of admissions for certain diseases for All-India during the year 1936.

Months.	Enteric group of fevers.	Influenza.	Cholera.	Small-pox.	Malaria.	Dysentery protozoal.	Dysentery bacillary.	Dysentery bacillary exudate.	Dysentery group.	Pyrexia of uncertain origin.	Pneumonia lobar and lobular.	Diarrhœa.	Dengue.	Sand-fly fever.	Plague.	Effects of heat.	All causes.
January	0·03	0·4	...	0·02	3·0	0·02	0·2	0·1	0·04	...	0·9	0 3	0·03	0 01	...	...	25·6
February	0·04	0·2	...	0·03	1·8	0·01	0·1	0·1	0·04	0.01	0·8	0·3	0·01	...	...	...	21·9
March	0·04	1·7	...	0·01	1·7	0·03	0·1	0·1	0·1	0·01	0·4	0·3	0·03	0·03	...	...	23·5
April	0·01	0·5	...	0·01	2·7	0·04	0·5	0·2	0·2	0·04	0·4	0·6	0·1	0·3	...	...	25·5
May	0·04	0·5	0·01	0·02	4·9	0·1	0·4	0·3	0·3	0·01	0·3	0·9	0 3	2·4	...	0·04	33·0
June	0·1	0·3	...	0·02	9·4	0·1	0·6	0·3	0·2	0·01	0·3	0·8	0·3	2·0	...	..	36·3
July	0·1	0·6	...	0·03	15·9	0·1	0·8	0·4	0·2	0·01	0·2	0·6	0·5	1·9	...	0·1	45·0
August	0·1	0·5	...	0·01	18·5	0·1	0·8	0·3	0·3	...	0·2	0·8	0·5	1·9	...	0·01	47·9
September	0·1	0·3	...	...	20·7	0·03	0·5	0·3	0·3	...	0·2	0·5	0·3	1·1	...	0·03	46·8
October	0·03	0·3	...	0·01	19·9	0·1	0·6	0·2	0·2	...	0·3	0·4	0·2	0·9	...	0 01	46·2
November	0·03	1·1	...	0·02	16·5	0·05	0·6	0·1	0·1	...	0 5	0·5	0·2	0·3	...	...	42·3
December	0·1	0·8	...	0·01	7·9	0·1	0·5	0·2	0·1	..	0·7	0·4	0·1	0·1	...	...	32·6
Total	0·7	7·3	0·01	0·2	122·9	0·6	5·7	2·6	2·0	0·1	5·3	6·2	2·5	10·6	...	0·2	425·7

TABLE

" INDIAN OFFICERS AND

Table showing ratios per 1,000 of strength of admissions for certain

Stations and Districts.	Average annual strength.	Enteric group of fevers.					Dysentery.			
		Typhoid fever.	Para. A.	Para. B.	Para. C.	Enteric group.	Bacillary.	Bacillary exudate.	Protozoal.	Clinical
Chitral	155	..	..	..	..	..	..	..	..	..
Drosh	835	..	..	..	..	..	..	..	..	2·4
Landikotal	1,819	..	..	..	..	1·1	3·3	2·2	..	7·7
Malakand	692	..	..	..	..	..	..	..	..	8·7
Mardan	990	..	..	..	..	..	4·0	2·0	..	1·0
Nowshera	2,791	0·4	..	..	..	0·4	2·5	0·7	..	3·2
Peshawar	5,773	..	..	0·2	..	0·2	10·1	2·8	0·5	6·4
Shagai	610	..	..	..	..	..	1·6	1·6	..	1·6
Risalpur	850	..	..	..	..	..	..	..	..	..
Total Peshawar Distt.	14,515	0·1	...	0·1	..	0·3	5·2	1·7	0·2	4·8
Fort Lockhart	342	..	..	..	..	..	..	..	..	..
Kohat	4,043	..	..	..	..	0·2	11·6	3·7	1·2	1·5
Thal	1,013	..	..	..	..	..	..	..	..	..
Total Kohat District	5,398	..	..	..	..	0·2	8·7	2·8	0·9	1·1
Abbottabad	3,877	0·3	..	..	..	..	1·8	..	..	0·3
Campbellpore	97	..	..	..	..	..	103·1	..	..	..
Jhelum	2,357	..	..	..	..	..	7·2	1·7	..	3·8
Kalabagh (Hazara)	119	..	..	..	..	..	..	..	..	8·4
Kuldana	226	..	..	..	..	..	..	4·4	..	..
Mona	39	..	..	..	..	..	..	..	..	..
Sargodha	49	..	..	..	..	..	..	..	..	..
Rawalpindi	4,553	0·2	0·2	..	..	..	7·7	3·1	0·4	0·2
Total Rawalpindi District	11,317	0·2	0·1	..	..	..	5·3	1·7	0·2	1·1
Ambala	2,439	..	..	..	..	..	3·7	2·1	0·4	2·1
Amritsar	157	..	..	..	..	..	6·4	..	..	6·4
Bakloh	802	1·2	1·2	..	..	..	..	1·2	..	1·2
Dagshai	9	..	..	..	..	..	..	..	..	..
Dalhousie	10	..	..	..	..	..	..	..	..	..
Dharamsala	1,106	..	..	..	..	..	..	1·8	..	1·8
Ferozepore	1,881	..	0·5	..	..	0·5	0·5	..	0·5	1·1
Jullundur	1,851	..	1·1	..	..	1·6	1·1	11·9	8·6	2·7
Jutogh	188	..	..	..	..	..	..	..	..	5·3
Lahore	2,351	0·4	..	..	..	0·9	1·7	3·4	..	0·9
Multan	580	..	..	..	..	..	1·7	..	..	..
Sialkot	1,976	..	..	..	..	..	2·0	1·0	..	2·0
Solon	3	..	..	..	..	..	..	..	..	..
Subathu	7	..	..	..	..	..	..	..	..	..

XXIII.

INDIAN OTHER RANKS.

diseases in each Station and District in India during the year 1936.

Colitis.	Diarrhœa.	Cholera.	Venereal diseases.	Small-pox.	Malaria.	Dengue.	Sand-fly fever.	Plague.	Influenza.	Pneumonia lobar and lobular.	Heat-stroke.	Heat-exhaustion.	All causes.	Average number constantly sick.
..	..	..	..	..	..	..	19·4	..	..	6·5	..	..	116·1	3·68
..	1·2	..	..	..	45·5	..	31·1	..	7·2	..	..	..	229·9	5·84
0·5	3·3	..	3.8	..	131·9	..	53·3	..	8·8	4·9	..	..	360·1	9·56
..	..	..	1·4	..	407·5	..	99·7	..	..	7·2	..	..	628·6	12·51
..	3·0	..	2·0	1·0	153·5	..	10·1	..	4·0	4·0	..	..	388·9	11·62
..	7·2	..	7·9	..	116·1	..	8·2	..	4·3	4·7	..	2·1	402·0	14·4
..	3·3	..	6·9	0·2	168·2	..	47·5	..	0·3	6·9	..	0·2	433·4	13·50
..	3·3	..	4·9	..	511·5	..	19·7	..	34·4	..	..	..	803·3	13·11
..	10·6	..	4·7	..	61·2	..	11·8	..	..	4·7	..	..	281·2	7·36
0·1	4·1	..	5·4	0·1	163·3	..	36·1	..	4·2	5·2	..	0·5	416·0	12·10
..	2·9	..	..	..	190·1	..	..	..	..	5·8	..	..	482·5	9·06
..	11·9	..	6·4	..	155·1	..	13·1	..	..	4·5	0·2	..	392·0	13·80
..	11·8	..	3·0	..	191·5	..	16·8	..	..	8·9	..	..	406·7	9·78
..	11·3	..	5·4	..	164·1	..	13·0	..	..	5·4	0·2	..	400·5	12·74
0·8	9·0	..	6·2	..	85·6	..	..	..	..	8·3	..	..	361·1	11·23
..	..	..	..	..	206·2	..	..	..	..	103·1	..	..	2,164·9	55·67
0·4	1·3	..	3·4	..	204·1	0·4	1·7	..	..	6·4	0·4	2·1	373·4	9·45
..	..	..	..	..	42·0	..	..	..	8·4	..	..	..	260·5	7·56
..	4·4	..	..	..	101·8	..	8·8	..	4·4	..	..	..	287·6	22·95
..	..	..	256·4	..	2,051·3	..	..	..	..	..	..	..	9,487·2	171·79
..	204·1	..	..	..	..	..	204·1	..	408·2	204·1	..	..	3,877·6	69·39
..	16·9	..	8·3	0·4	109·2	..	10·8	..	2·9	6·6	..	0·4	472·7	19·17
0·4	10·3	..	6·3	0·2	119·1	0·1	4·9	..	1·5	7·0	0·1	0·6	406·9	14·19
..	0·8	..	7·4	..	90·2	..	11·1	..	2·5	7·4	..	0·4	330·5	15·81
..	..	..	6·4	..	101·9	..	6·4	..	..	12·7	..	..	547·8	18·03
..	..	..	1·2	..	150·9	..	5·0	..	..	12·5	..	..	304·2	10·59
..	..	..	..	..	..	..	..	..	..	222·2	..	..	222·2	10·00
..	..	..	..	..	..	..	..	..	..	..	..	..	200·0	11·00
..	2·7	..	1·8	..	109·4	..	0·9	..	5·4	2·7	..	..	260·4	9·79
..	8·5	..	9·6	..	69·6	..	28·2	..	..	12·8	..	..	364·2	14·84
..	..	..	3·2	1·6	197·7	..	4·9	..	..	4·9	..	..	402·5	17·81
..	16·0	..	26·6	..	31·9	..	..	..	53·2	10·6	..	..	361·7	13·99
1·3	11·5	..	10·6	..	80·8	..	28·1	..	13·2	7·7	..	..	441·5	12·05
..	1·7	..	8·6	..	132·8	..	12·1	..	..	5·2	..	..	348·3	14·16
..	6·6	..	5·1	..	28·8	..	1·0	..	..	2·5	..	..	379·6	14·22
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..

TABLE

Stations and Districts.	Average annual strength.	Enteric group of fevers.					Dysentery.			
		Typhoid fever.	Para. A.	Para. B.	Para. C.	Enteric group.	Bacillary.	Bacillary exudate.	Protozoal.	Clinical.
Total Lahore District	13,360	0·1	0·3	..	..	0·4	1·6	3·0	1·3	1·6
Bannu	2,035	..	0·5	..	..	..	..	8·4	0·5	1·5
D. I. Khan	101	..	..	..	..	..	..	..	..	..
Kalabagh and Mari Indus	158	..	..	..	..	..	12·7	..	..	6·3
Manzai	781	..	..	..	..	..	1·3	..	..	..
Mir Ali	718	..	..	..	..	..	..	..	..	..
Razmak	4,677	0·4	0·4	..	..	..	8·3	1·7	0·2	1·7
Wana	3,279	..	..	..	..	..	3·0	0·9	..	2·1
Total Waziristan District	11,749	0·2	0·3	..	..	..	4·4	2·4	0·2	1·6
Chaman	1,302	..	..	..	..	0·8	1·5	1·5	..	0·8
Quetta	4,954	0·4	0·2	..	..	0·2	2·6	2·4	0·4	4·2
Sibi	245	..	..	..	..	..	..	4·1	..	4·1
Total Baluchistan District	6,501	0·3	0·2	..	..	0·3	2·3	2·3	0·3	3·5
Fort Sandeman	2,132	..	..	..	..	0·5	1·4	1·9	..	0·9
Hindubagh	298	..	..	..	..	..	..	..	..	3·4
Loralai	1,245	..	..	..	..	1·6	..	0·8	..	1·6
Total Zhob Bde. Area	3,675	..	..	.	..	0·8	0·8	1·4	..	1·4
Hyderabad	565	..	..	..	..	..	1·8	5·3	..	..
Karachi	1,744	..	..	..	..	..	5·7	1·7	1·1	2·3
Total Sind Bde. Area	2,309	..	..	..	..	..	8·2	2.6	0·9	1·7
Bareilly	1,110	0·9	..	..	..	..	10·8	2·7	..	1·8
Dehra Dun	3,055	1·6	..	..	..	0·7	5·2	0·7	1·0	0·7
Jhansi	877	..	..	..	..	..	12·5	5·7	1·1	3·4
Landsdowne	1,972	..	..	..	..	..	2·0	10·1	..	6·6
Meerut	2,349	..	..	..	..	0·4	11·9	6·8	0·4	0·4
Nowgong	66	15·2	..	..	..	..	..	..	15·2	..
Roorkee	2,402	..	0·4	..	..	0·4	..	..	..	3·3
Total Meerut District	11,831	0·6	0·1	..	..	0·3	6·0	3·9	0·5	1·8
Almora	306	..	..	..	..	..	9·8	..	..	..
Allahabad	735	..	..	..	..	..	6·8	1·4	5·4	2·7
Benares	299	..	..	..	..	..	3·3	6·7	..	3·3
Cawnpore	91	..	..	..	..	..	11·0	..	..	..
Fatehgarh	663	..	..	..	..	..	..	..	..	..
Fyzabad	126	..	..	..	..	7·9	..	..	..	7·9
Gorakhpore	124	8·1	..	..	..	..	..	..	..	..
Lucknow	1,576	0·6	..	..	..	..	21·6	4·4	..	4·4
Total Lucknow District	3,920	0·5		..	..	0·3	11·2	2·6	1·0	2·8
Calcutta (Alipore)	752	1·3	..	..	..	..	17·3	4·0	2·7	..
Dinapore	37	..	..	..	..	..	..	..	..	27·0
Gyantse	91	..	..	..	..	..	..	..	..	..
Ghoom	82	..	..	..	..	..	..	..	..	..
Shillong	1,832	..	..	..	..	..	1·1	3·3	..	1·1
Bankura	36	..	..	..	..	..	..	..	..	..
Chittagong	466	..	..	..	..	2·1	6·4	..	..	..
Comilla	654	..	..	..	..	..	..	..	..	..
Dacca	612	1·6	..	..	..	1·6	..	..	..	1·6
Mymensingh	172	..	..	..	..	..	..	..	..	..
Midnapore	505	..	..	..	..	..	2·0	4·0	..	..
Saidpur	551	..	..	..	..	..	10·9	..	..	..

XXIII—*contd.*

Colitis.	Diarrhœa.	Cholera.	Venereal diseases.	Small-pox.	Malaria.	Dengue.	Sand-fly fever.	Plague.	Influenza.	Pneumonia lobar and lobular.	Heat-stroke.	Heat-exhaustion.	All causes.	Average number constantly sick.
0·2	4·9	..	6·8	0·2	96·9	..	12·7	..	4·0	7·2	..	0·1	368·0	14·17
..	23·1	..	14·7	..	146·9	..	94·3	..	9·8	10·8	..	..	608·4	18·77
..	..	..	9·9	..	277·2	..	59·4	..	..	..	..	..	564·4	20·89
..	12·7	..	..	..	272·2	..	6·3	..	..	31·6	..	..	886·1	22·97
..	5·1	..	11·5	..	46·1	..	10·2	..	..	..	..	..	248·4	8·83
..	16·7	..	8·4	..	352·4	..	16·7	..	..	4·2	..	..	583·6	12·87
..	7·3	..	8·3	..	79·5	..	0·2	..	8·8	4·9	..	..	444·9	19·48
..	4·0	..	5·2	..	284·5	0·3	0·3	..	59·2	7·3	..	..	680·1	19·95
..	9·5	..	8·7	..	167·2	0·1	18·8	..	21·7	6·6	..	..	541·2	18·43
..	3·8	..	1·5	..	79·9	..	4·6	..	..	6·9	..	..	404·8	11·07
..	4·4	..	2·0	0·2	99·7	..	1·0	..	3·4	5·7	..	..	376·1	19·47
..	8·2	..	4·1	..	65·3	..	..	..	..	12·2	..	..	257·1	10·45
..	4·5	..	2·0	0·2	94·4	..	1·7	..	2·6	6·2	..	..	377·3	17·45
..	8·4	..	5·2	..	190·4	..	4·2	..	..	6·1	..	..	435·7	10·23
..	6·7	..	3·4	..	144·3	..	10·1	..	63·8	13·4	..	..	416·1	7·65
0·8	5·6	..	5·6	0·8	289·2	..	20·9	..	37·8	3·2	..	..	522·9	11·57
0·3	7·3	..	5·2	0·3	220·1	..	10·3	..	18·0	5·7	..	..	463·7	10·48
..	1·8	..	10·6	..	49·6	..	..	..	..	..	..	..	187·6	7·68
1·1	2·9	..	8·6	..	87·2	0·6	8·6	..	..	1·7	..	..	290·1	12·88
0·9	2·6	..	9·1	..	78·0	0·4	6·5	..	..	1·3	..	..	265·0	11·61
..	9·0	..	6·3	..	148·6	..	..	..	..	3·6	..	..	451·4	16·32
..	5·9	0·3	14·4	1·0	81·5	..	20·9	..	2·6	5·9	..	..	469·7	20·85
..	4·6	..	9·1	..	171·0	..	4·6	..	10·3	1·1	..	..	550·7	16·83
..	9·1	..	15·2	..	174·9	..	..	..	11·7	8·1	..	..	474·1	20·10
..	0·4	..	16·2	..	77·9	..	..	..	..	8·9	..	..	201·2	14·58
..	..	..	..	..	227·3	..	..	..	15·2	..	..	..	545·5	13·94
..	3·3	..	8·3	1·7	125·3	..	..	..	1·2	6·2	..	..	321·0	10·08
..	5·0	0·1	12·4	0·6	119·0	..	5·7	..	3·7	6·3	..	..	409·5	16·53
..	9·8	..	6·5	..	127·5	..	..	..	..	3·3	..	..	379·1	20·39
8·2	5·4	..	17·7	1·4	68·0	1·4	2·7	..	10·9	4·1	..	..	483·0	19·01
..	3·3	..	6·7	..	36·8	23·4	..	..	..	3·3	..	..	478·3	18·73
..	22·0	..	11·0	..	54·9	44·0	11·0	..	..	11·0	..	..	351·6	11·54
..	9·0	..	3·0	1·5	294·1	1·5	..	..	3·0	4·5	..	..	482·7	16·35
..	..	..	..	..	134·9	..	..	..	47·6	..	..	..	412·7	15·24
..	..	..	..	..	177·4	..	..	..	..	16·1	..	..	379·0	10·40
..	8·0	..	17·1	..	75·5	..	8·2	..	10·2	0·6	..	..	462·6	20·79
1·5	7·7	..	12·0	0·5	116·8	3·3	4·1	..	8·2	3·1	..	..	457·7	16·24
..	1·3	..	17·3	..	46·5	12·0	..	..	1·3	1·3	..	..	421·5	38·35
..	..	..	..	..	..	..	..	..	..	54·1	..	..	297·3	10·81
..	..	..	..	..	11·0	..	..	..	..	11·0	..	..	153·8	3·63
..	..	..	12·2	..	134·1	..	..	..	..	..	..	..	304·9	7·56
0·5	9·3	..	9·3	..	153·4	..	..	..	..	9·8	..	..	479·8	16·24
..	..	..	..	..	..	..	..	..	..	..	..	..	111·1	4·17
..	..	..	53·6	..	154·5	..	..	..	32·2	4·3	..	..	493 6	12·32
..	..	..	22·6	..	166·7	..	..	..	2·8	8·5	..	..	426·6	10·85
..	..	..	21·2	..	37·6	..	..	..	22·9	..	..	..	197·7	9·02
..	..	..	29·1	5·8	104·7	..	..	..	5·8	..	..	..	430·2	12·38
..	..	..	9·9	..	73·3	..	5·9	..	15·8	2·0	..	..	241·6	7·11
..	3·6		18·1	..	61·7	..	..	..	..	7·3	..	..	304·9	7·73

TABLE

Stations and Districts.	Average annual strength.	Enteric group of fevers.					Dysentery.			
		Typhoid fever.	Para. A.	Para. B.	Para. C.	Enteric group.	Bacillary.	Bacillary exudate.	Protozoal.	Clinical.
Total P. & A. District. . .	5,490	0·4	..	..	..	0·4	4·6	2·0	0·4	0·7
Agra	542	..	..	..	..	..	1·8	3·7	1·8	1·8
Delhi	1,504	..	..	..	..	0·7	2·0	2·0	..	1·3
Muttra	627	..	..	..	..	1·6	3·2	..	..	1·6
Total Delhi Bde. Area . .	2,673	..	..	..	..	0·7	2·2	1·9	0·4	1·5
Ahmednagar . . .	988	..	..	..	..	..	..	3·0	..	..
Aurangabad . . .	963	1·0	..	..	..	..	8·3	1·0	..	6·2
Jubbulpore . . .	2,414	..	..	..	..	..	9·5	4·6	0·8	..
Kamptee	568	..	..	..	..	..	1·8	..	..	1·8
Pachmarhi . . .	348	..	..	..	..	..	2·9	2·9	..	..
Saugor	529	..	1·9	..	..	..	5·7	1·9	..	..
Trimulgherry (Secunderabad).	3,027	1·3	..	..	..	1·0	17·2	1·3	2·6	1·3
Total Deccan District . .	8,837	0·6	0·1	..	..	0·3	10·0	2·4	1·1	1·2
Belgaum	1,186	..	..	..	..	..	2·5	2·5	..	..
Poona	3,324	0·3	0·3	..	..	0·3	21·1	7·2	0·9	0·3
Total Poona Bde. Area . .	4,510	0·2	0·2	..	..	0·2	16·2	6·0	0·7	0·2
Ahmedabad	598	..	..	..	..	..	3·3	1·7	..	..
Baroda	554	..	..	..	..	1·8	3 6	14·4	..	3·6
Bombay (Colaba). . .	515	..	..	..	..	1·9	3·9	3·9	..	..
Deolali	255	..	..	..	..	..	..	3·9	..	..
Mhow	682	..	..	..	..	..	4·4	..	..	1·5
Mt. Abu	19	..	..	..	..	..	..	..	..	..
Nasirabad	721	1·4	1·4	..	..	1·4	9·7	1·4	1·4	2·8
Neemuch	413	..	..	..	..	2·4	9·7	..	..	2·4
Total Bombay District . .	3,757	0·3	0·3	..	..	1·1	5·3	3·5	0·3	1·6
Bangalore . . .	2,641	0·4	0·4	..	..	..	8·0	2·3	0·4	..
Cannanore . . .	563	..	..	..	..	1·8	1·8	..	..	1·8
Madras, St. Thomas Mt. . . .	504	..	..	..	..	..	7·9	2·0	..	2·0
Trichinopoly . . .	109	..	..	..	..	..	18·3	..	..	..
Wellington . . .	42	..	..	..	..	..	..	..	..	..
Total Madras District . .	3,859	0·3	0·3	..	..	0·3	7·3	1·8	0·3	0·5
Mandalay	729	1·4	..	..	..	..	..	11·0	1·4	4·1
Maymyo	1,291	..	..	..	..	..	..	7·0	..	1·5
Mingaladon . .	807	..	..	..	..	..	13·6	7·4	14·9	8·7
Total Burma District . .	2,827	0·4	..	..	..	..	3·9	8·1	4·6	4·2
Total All-India . .	116,528	0·2	0·1	0·0	..	0·3	5·6	2·7	0·6	2·0

XXIII—*concld.*

Colitis.	Diarrhœa.	Cholera.	Venereal diseases.	Small-pox.	Malaria.	Dengue.	Sand-fly fever.	Plague.	Influenza.	Pneumonia, lobar and lobular.	Heat-stroke.	Heat-exhaustion.	All causes.	Average number standly sick.
0·2	3·6	..	17·7	0·2	104·0	1·6	0·5	..	7·3	5·8	..	..	385·4	15·42
..	20·3	..	5·5	..	226·9	..	..	..	..	1·8	..	..	540·6	15·96
..	..	..	14·6	..	131·0	..	..	..	..	6·6	..	..	396·9	14·45
..	1·6	..	22·3	..	59·1	..	..	..	..	9·6	..	..	531·1	18·29
...	4·5	..	14·6	..	133·6	..	..	..	..	6·4	..	..	457·5	15·66
1·0	3·0	..	9·1	..	40·5	..	..	..	1·0	5·1	..	1·0	215·6	7·23
..	..	..	5·2	..	151·6	..	2·1	..	..	2·1	..	..	353·1	12·14
0·8	3·3	..	5·4	..	108·5	..	..	..	29·4	2·1	..	..	408·5	14·31
..	3·5	..	3·5	..	109·2	5·3	49·3	..	1·8	..	..	..	376·8	10·63
..	2·9	..	5·7	..	158·0	..	..	..	17·2	..	..	..	250·0	4·37
..	5·7	..	5·7	1·9	88·8	..	..	..	..	3·8	..	..	514·2	14·50
0·3	3·6	..	4·6	..	28·4	2·3	3·3	..	5·0	1·7	..	..	366·7	15·45
0·5	3·2	..	5·4	0·1	79·0	1·1	4·5	..	10·6	2·2	..	0·1	364·6	13·06
1·7	..	..	11·0	..	39·6	..	..	..	..	2·5	..	..	585·2	15·24
3·0	7·5	..	20·2	..	101·4	..	..	..	20·2	3·0	..	..	433·8	15·22
2·7	5·5	..	17·7	..	85·1	..	..	..	14·9	2·9	..	..	473·6	15·22
..	..	..	1·7	..	235·8	6·7	..	..	..	6·7	..	..	434·8	10·43
..	..	..	7·2	..	182·3	..	..	..	..	5·4	..	..	373·6	9·73
..	5·8	..	9·7	..	68·0	..	..	..	3·9	5·8	..	..	380·6	26·68
7·8	8·9	..	15·7	..	82·4	..	..	..	..	..	..	..	502·0	16·86
..	5·9	..	4·4	..	73·3	..	4·4	..	4·4	2·9	..	1·5	294·7	12·92
..	..	..	..	..	..	..	..	..	..	..	..	..	105·3	3·16
..	8·3	..	4·2	..	77·7	..	..	..	..	8·3	..	..	330·1	17·81
..	2·4	..	2·4	..	104·1	..	2·4	..	..	2·4	..	..	324·5	11·28
0·5	4·0	..	5·6	..	119·0	1·1	1·1	..	1·3	5·1	..	0·3	363·6	14·92
..	1·9	..	13·6	..	42·4	0·4	..	..	19·7	3·8	..	..	405·9	22·26
1·8	1·8	..	10·7	..	12·4	..	..	..	3·6	..	..	..	305·5	12·38
..	9·9	..	27·8	..	9·9	339·3	..	..	14·9	..	..	..	621·0	18·81
9·2	..	..	18·3	..	..	36·7	..	..	9·2	..	..	..	293·6	7·80
..	..	..	23·8	..	..	..	..	..	..	..	..	..	71·4	4·76
0·5	2·9	..	15·3	..	32·1	45·6	..	..	16·1	2·6	..	..	412·5	19·77
..	32·9	..	126·2	..	82·3	43·9	..	..	..	2·7	..	..	607·7	44·14
0·8	15·5	..	23·2	..	241·7	1·5	..	..	29·4	2·3	..	..	897·8	25·62
..	6·2	..	70·6	..	66·9	59·5	..	..	..	1·2	..	..	1,187·1	37·65
0·4	17·3	..	63·3	..	150·7	29·0	..	..	13·4	2·1	..	..	905·6	33·97
0·3	6·2	0·0	9·8	0·2	123·1	2·5	10·6	..	7·3	5·4	0·02	0·1	426·5	15·43

TABLE XXIV.

BRITISH OFFICERS OF THE INDIAN ARMY.

Table showing the average strength, admissions into hospital, deaths, numbers invalided and average constantly sick, during the year 1936, with ratios per 1,000 of the strength.

Diseases.	Actuals.				Ratio per 1,000.			
Average strength, 2,059.	Admissions.	Deaths.	Invalids sent home.	Average number constantly sick.	Admissions.	Deaths.	Invalids sent home.	Constantly sick.
Specific Diseases due to infection or infestation.								
Common Cold	15	...	...	0·19	7·3	...	...	0·09
Diphtheria	...	...	...	...	...	...	...	...
Dysentery	41	...	...	1·56	19·9	...	...	0·76
Enteric fever (inclusive of typhoid, Para. A, B & C and enteric group).	2	...	1	0·36	1·0	...	0·49	0·17
Erysipelas	...	...	...	...	...	...	...	...
Influenza	18	...	...	0·35	8·7	...	...	0·17
Malaria	71	...	...	1·88	34·5	...	...	0·91
Measles	1	...	...	0·03	0·5	...	...	0·01
Meningococcal infection (cerebro-spinal fever)	...	...	...	...	...	...	...	...
Mumps	2	...	...	0·13	1·0	...	...	0·06
Pneumonia	6	1	...	0·82	2·9	0·49	...	0·40
Pyrexia of uncertain origin	...	...	...	...	...	...	...	...
Rheumatic fever	...	...	...	...	...	...	...	...
Sand-fly fever	49	...	...	0·84	23·8	...	...	0·41
Scarlet fever	...	...	...	...	...	...	...	...
Small-pox	2	...	...	0·12	1·0	...	...	0·06
Tuberculosis — Pulmonary	...	...	...	...	...	...	...	...
Tuberculosis — Other	1	...	...	0·01	0·5	...	...	0·00
Venereal diseases — Gonorrhœa	2	...	...	0·23	1·0	...	...	0·11
Venereal diseases — Soft chancre	...	...	...	...	...	...	...	...
Venereal diseases — Syphilis	...	...	...	...	...	...	...	...
Venereal diseases — Other V.D.	...	...	...	...	...	...	...	...
Other diseases due to infection	33	1	1	1·48	16·0	0·49	0·49	0·72
Diseases due to infestation by Metazoan parasites — Scabies	...	...	...	...	...	...	...	...
Diseases due to infestation by Metazoan parasites — Other diseases	2	...	...	0·02	1·0	...	...	0·02

Other diseases classified under systems.

Diseases of the nervous system	16	...	2	0·80	7·8	...	0·97	0·39
Mental diseases	4	...	1	0·37	1·9	...	0·49	0·18
Diseases of the eye	7	...	...	0·08	3·4	...	...	0·04
Diseases of the ear and nose	22	...	...	0·49	10·7	...	...	0·24
Diseases of the circulatory system. — Valvular diseases of the heart	1	...	1	0·04	0·5	...	0·49	0·02
Diseases of the circulatory system. — Disordered action of the heart	1	1	...	0·01	0·5	0·49	...	0·00
Diseases of the circulatory system. — Other diseases	5	1	...	0·23	2·4	0·49	...	0·11
Diseases of the blood and blood forming organs	3	...	...	0·03	1·5	...	...	0·01
Diseases of ductless or endocrine glands	...	...	...	...	...	...	...	...
Diseases of the breast	...	...	...	...	...	...	...	...
Diseases of the respiratory system. — Larynx and trachea	...	...	...	...	...	...	...	...
Diseases of the respiratory system. — Bronchi & bronchioles	2	...	...	0·60	10·7	...	...	0·29
Diseases of the respiratory system. — Other diseases	1	...	...	0·08	0·5	...	...	0·04
Diseases of the teeth and gums	7	...	...	0·10	3·4	...	...	0·05
Diseases of the digestive system. — Inflammation of the tonsils.	51	...	1	0·97	24·8	...	0·49	0·47
Diseases of the digestive system. — Inflammation of pharynx.	9	...	...	0·13	4·4	...	...	0·06
Diseases of the digestive system. — Inflammation of stomach.	13	...	...	0·29	6·3	...	...	0·14
Diseases of the digestive system. — Gastric ulcer	...	...	...	...	...	...	...	...
Diseases of the digestive system. — Duodenal ulcer	5	...	...	0·46	2·4	...	...	0·22
Diseases of the digestive system. — Liver diseases	13	...	...	0·61	6·3	...	...	0·30
Diseases of the digestive system. — Other diseases	119	2	...	3·81	57·8	0·97	...	1·85
Diseases due to disorders of nutrition or of metabolism	4	...	...	0·09	1·9	...	...	0·04
Diseases of the generative system	7	...	...	0·30	3·4	...	...	0·15
Diseases of bones, joints, muscles, fasciae and bursae	18	...	1	0·64	8·7	...	0·49	0·31
Diseases of the areolar tissue	50	...	1	1·30	24·3	...	0·49	0·64
Diseases of the skin	6	...	...	0·21	2·9	...	...	0·10
Diseases of the urinary organs	17	...	1	0·54	8·3	...	0·49	0·26
Injuries — General	7	...	1	0·40	3·4	...	0·49	0·19
Injuries — Local	91	3	...	3·15	44·2	1·46	...	1·53
Injuries — In action	...	...	...	...	...	...	...	...
Tumours and cysts	4	...	...	0·09	1·9	...	...	0·04
Poisons	1	...	...	0·02	0·5	...	...	0·01
No appreciable disease	1	...	...	0·03	0·5	...	...	0·01
Suicides	...	...	...	...	...	...	...	...
Total	750	9	11	23·89	364·3	4·37	5·34	11·60

TABLE XXV.

INDIAN OFFICERS AND INDIAN OTHER RANKS.

Table showing admission and death ratios per 1,000 of strength by Commands contrasted with the previous year, and the average for the previous 5 years.

Commands.	Years.	Enteric group of fevers.		Influenza.		Cholera.		Small-pox.		Malaria.		Dysentery.	
		A.	D.	A.	D.	A.	D.	A.	D.	A	D	A	E
Northern Command	1931-35	2·0	0·18	9·3	0·01	0·0	..	0·2	0·02	189·6	0·10	13·5	0·02
	1935	1·6	0·09	5·4	0·04	..	..	0·2	0·02	137·0	0·05	11·8	0·04
	1936	0·5	0·02	6·9	0·02	0·0	0·02	0·1	..	139·6	0·05	9·7	0·05
Western Command	1931-35	2·6	0·15	6·0	0·01	0·0	..	0·2	..	201·1	0·07	22·7	0·06
	1935	1·3	0·07	4·6	0·07	..	..	0·1	..	175·0	0·22	9·5	..
	1936	0·6	0·08	6·6	..	..	..	0·2	..	128·4	0·08	7·3	..
Eastern Command	1931-35	1·9	0·16	9·3	0·01	0·0	0·02	0·3	0·01	121·4	0·07	13·6	0·03
	1935	1·5	0·13	6·5	..	..	..	0·4	..	111·3	0·08	12·7	..
	1936	0·9	..	4·9	..	0 0	0 04	0·4	..	116·8	0·13	11·3	0·04
Southern Command	1931-35	1·6	0·13	9·5	..	..	0·01	0·2	0·04	84·8	0·02	15·7	0·03
	1935	1·1	0·19	5·5	..	0·0	0·05	0·1	0·09	80·7	..	13·0	..
	1936	1·0	0·14	10·9	..	..	..	0·0	..	78·9	..	14·9	..
Burma District	1931-35	2·6	0·10	20·6	..	..	..	0·1	..	156·1	0·26	13·7	..
	1935	0·7	..	1·0	..	..	..	..	..	138·8	0·33	20·3	..
	1936	0·4	..	13·4	..	..	..	..	..	150·7	0·35	20·9	..
All-India	1931-35	2·0	0·16	9·3	0·01	0·0	0·01	0·2	0·02	157·7	0·08	15·0	0·03
	1935	1·4	0·11	5·4	0·03	0·0	0·02	0·2	0·03	125.9	0·08	12·2	0·02
	1936	0·7	0·04	7·3	0·01	0·0	0·01	0·2	..	123·1	0·07	11·0	0·03

		Pyrexia of Uncertain origin.		Pneumonia lobar and lobular.		Venereal diseases.		Dengue.		Sand-fly fever.		Plague.	
		A.	D.	A.	D.	A.	D.	A.	D.	A.	D.	A.	D.
Northern Command	1931-35	0·1	0·01	6·0	0·91	7·8	0·01	0·0	..	20·2	..	..	0·00
	1935	0·1	..	5·1	0·65	7·4	..	0·0	..	14·3	..	..	..
	1936	0·1	0·02	6·3	0·78	6·5	..	0·0	..	18·5	..	..	..
Western Command	1931-35	0·1	..	6·2	0·81	5·6	0·01	0·1	..	9·0	..	..	..
	1935	...	..	5·5	0·82	4·9	..	..	..	2·9	..	..	..
	1936	...	..	5·1	0·40	4·2	..	0·1	..	5·1	..	..	..
Eastern Command	1931-35	0·1	..	6·4	0·52	13·5	..	1·0	..	2·9	..	..	..
	1935	0·0	..	5·9	0·25	14·6	..	1·1	..	1·4	..	0·0	0·04
	1936	..	..	5·7	0·67	13·8	..	0·9	..	3·6	..	..	..
Southern Command	1931-35	0·4	0·02	4·4	0·46	11·9	0·01	4·9	..	2·4	..	0·1	0·09
	1935	0·0	...	3·1	0·33	9·4	0·05	10·4	..	1·0	..	..	..
	1936	0·2	..	2·9	0·24	10·0	..	9·1	..	2·1	..	..	..
Burma District	1931-35	0·1	..	6·4	0·62	42·1	...	33·3	..	0·6	..	0·01	..
	1935	0·3	..	4·9	...	51·9	..	47·0	..	..	..	..	..
	1936	..	..	2·1	0·35	63·3	..	29·0	..	..	..	..	..
All-India	1931-35	0·2	0·01	6·8	0·73	10·5	0·01	2·2	..	11·7	..	0·0	0·02
	1935.	0·1	...	4·9	0·51	10·1	0·01	3·4	..	7·5	..	0·0	0·01
	1936.	0·1	0·01	5·4	0·61	9·8	..	2·5	..	10·6	..	..	..

TABLE XXVI.

DETAIL OF DISEASES.

1936.

Diseases.	European Army of India.										Indian Army.					
	British officers attached to European troops. 2,269.			Men. 52,059.			Women. 4,055.		Children. 6,192.		British officers attached to Indian troops. 2,059.			Men present. 116,528.			
	A.	D.	Invalids	A.	Constantly sick.	D.	Invalids.	A.	D.	A.	D.	A.	D.	Invalids.	A.	D.	Invalids.	Constantly sick.
Diseases caused by infection or infestation.																		
Anthrax	..	..	..	1	0·01	1	..	..	..	..	..	..	..	..	..	..	..	..
Blackwater fever	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Chicken-pox	1	..	..	10	0·47	..	..	..	..	44	..	1	..	..	97	..	..	5·78
Common cold	12	..	..	580	12·11	..	..	18	..	39	..	15	..	..	1241	..	..	21·69
Cholera	..	..	..	5	0·36	..	..	..	..	..	..	..	..	..	1	1	..	0·02
Cow-pox	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Dengue	16	..	..	244	5·83	..	..	17	..	4	..	6	..	..	297	..	..	6·67
Diphtheria	3	..	..	66	7·86	1	..	6	..	58	1	..	..	..	6	..	..	0·54
Dysentery :—																		
(*a*) Protozoal	14	..	..	138	10·78	..	3	9	..	5	..	11	..	..	75	2	..	5·39
(*b*) Bacillary	39	..	..	592	27·35	..	1	21	..	106	15	13	..	..	652	..	..	24·39
(*c*) Bacillary exudate.	20	..	..	288	10·88	..	..	10	..	5	1	10	..	..	316	2	..	12·47
(*d*) Clinical	19	..	..	265	10·07	..	..	8	..	27	..	7	..	..	284	..	..	7·77
Encephalitis (Lethargica)	..	..	..	1	0·11	..	1	..	..	2	..	..	..	..	..	..	..	..
Enteric Fevers—																		
(*a*) Typhoid fever	1	..	1	14	3·00	2	..	2	..	9	..	..	..	..	29	3	..	4·30
(*b*) Paratyphoid A.	1	..	..	13	2·10	..	2	..	..	..	..	2	..	1	14	..	..	2·10
(*c*) Paratyphoid B.	..	..	..	1	0·26	..	..	..	..	..	..	..	..	..	1	..	..	0·31
(*d*) Paratyphoid C.	..	..	..	1	0·05	..	..	..	..	..	..	..	..	..	..	..	..	..
(*e*) Enteric Group	4	..	1	47	6·58	1	..	..	..	1	..	..	..	..	34	2	..	4·63
Enteritis infective. (Including food poisoning)	..	..	..	16	0·33	..	..	..	..	..	..	..	..	..	..	..	..	..
Erysipelas	1	..	..	4	0·19	..	..	1	..	..	..	..	..	..	4	..	..	0·21
Gangrene, acute infective	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	0·12
Hydrophobia (Rabies)	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Influenza	30	..	..	646	17·80	..	..	..	..	1	1	..	..	..	1	1	..	0·00
Jaundice epidemic catarrhal	55	..	..	252	13·46	..	..	14	..	43	..	18	..	..	851	1	..	19·66
								9	..	27	..	16	..	..	197	..	..	11·85

Jaundice spirochætal	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Leishmaniasis:—																			
(*a*) Kala-azar	..	..	..	3	0·59	..	1	..	..	..	..	..	..	..	..	34	1	4	6·36
(*b*) Oriental sore	1	..	..	34	1·95	..	..	..	..	..	..	..	2	..	..	172	..	..	11·49
Leprosy	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	8	..	7	1·50
Malaria	71	..	..	3,017	112·13	3	2	82	..	89	..	..	71	..	..	14,340	8	..	348·05
Measles	..	..	..	10	0·40	..	..	2	..	21	..	..	1	..	..	156	..	..	6·35
Meningococcal infection (Cerebro-spinal fever)	..	..	..	1	0·20	1	1	..	..	..	..	..	..	..	..	16	4	1	1·51
Mumps	6	..	..	12	0·60	..	..	1	..	6	..	..	2	..	..	599	..	1	31·64
Plague	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Pyæmia	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4	2	2	1·08
Pyrexia of Uncertain Origin	1	..	1	10	0·90	..	..	..	..	..	..	..	..	..	..	10	1	..	0·63
Relapsing fever	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	0·07
Rheumatic fever	..	..	..	73	10·56	1	6	2	..	9	1	..	..	..	..	93	..	8	7·51
Rubella (German measles)	..	..	..	19	0·78	..	..	..	..	2	..	..	1	..	..	12	..	..	0·43
Sand-fly fever	64	..	..	1,758	34·57	..	..	12	..	14	..	..	49	..	..	1,236	..	..	21·66
Scarlet fever	..	..	..	7	0·64	..	..	..	..	11	..	..	..	..	..	..	..	..	..
Septicæmia	..	..	1	5	1·21	1	..	..	..	2	1	..	..	..	1	8	6	..	0·56
Small-pox	1	..	..	4	0·45	1	..	..	..	2	1	..	2	..	..	20	..	..	1·75
Tetanus	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	2	..	0·00
Tuberculosis Pulmonary	2	..	2	54	11·46	1	62	6	..	2	2	..	..	..	..	203	15	193	21·30
Tuberculosis Other cases	1	..	1	12	2·55	..	10	2	..	2	..	..	1	..	..	30	3	15	4·32
Typhus fever	1	..	1	44	3·49	3	..	1	..	2	..	..	5	..	..	48	1	..	4·66
Undulent fever	..	..	..	1	0·30	..	..	..	..	..	..	..	..	..	..	3	..	..	0·70
Venereal diseases—																			
(*a*) Gonorrhœa	1	..	..	1,340	172·51	..	2	1	..	3	..	..	2	..	..	561	..	1	61·32
(*b*) Soft chancre	..	..	..	241	25·64	..	..	..	..	..	..	..	..	..	..	181	..	..	15 34
(*c*) Syphilis	..	..	..	214	19·56	..	1	..	..	..	..	..	..	..	..	397	..	3	42·09
(*d*) Other cases	..	..	..	3	0·21	..	..	..	..	..	..	..	..	..	..	3	..	..	0·17
Whooping-cough	..	..	..	..	..	..	..	1	..	12	..	..	..	..	..	..	..	..	..
Other diseases caused by infection	..	..	..	11	0·43	1	1	1	.	6	1	..	2	1	..	16	2	1	1·06
Diseases due to infestation by Metazoan Parasites.																			
Ankylostomiasis	..	..	..	5	0·42	..	1	..	..	..	..	..	..	..	..	638	..	..	26·79
Ascariasis	..	..	..	6	0 23	..	..	1	..	8	..	..	..	..	..	144	..	..	4·96
Bilharziasis	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Dracontiasis (Guinea-worm)	..	..	..	...	...	..	..	..	..	..	..	..	1	..	..	171	..	..	13·52
Intestinal tæniasis:—																			
(*a*) Tænia Solium	..	..	..	17	0·35	..	..	2	..	6	..	..	..	..	..	17	..	..	0·64
(*b*) Tænia Saginata	3	..	..	134	2·84	..	..	12	..	37	..	..	1	..	..	52	..	..	1·68
Other Intestinal parasites	..	..	..	11	0·31	..	...	1	..	1	..	..	..	..	..	17	..	..	0·77
Pediculosis	..	..	..	8	0·20	..	..	..	..	..	..	..	..	..	..	6	..	..	0·28
Scabies	..	..	..	56	2·11	..	..	..	..	1	..	..	..	..	..	694	..	..	25·78
Other diseases due to infestation	..	..	..	16	0·50	..	1	2	..	3	..	..	...	..	..	27	-	1	1·27

A.—Admissions. D.—Deaths. *Includes one death from hæmorrhage encephalitis.

TABLE XXVI—*contd.*

Diseases.	European Army of India.										Indian Army.					
	British officers attached to European troops. 2,269			Men. 52,059				Women. 4,055		Children. 6,192				Men present. 116,288			
	A.	D.	Invalids.	A.	Constantly sick.	D.	Invalids.	A.	D.	A.	D.	A.	D.	Invalids.	A.	D.	Invalids.	Constantly sick.
Diseases of the nervous system.																		
Aphasia	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	0·05
Cerebral hæmorrhage	...	...	...	2	0·08	1	...	...	...	...	...	...	...	...	4	3	...	0·21
Chorea	...	...	...	1	0·28	...	1	...	...	4	...	...	...	...	...	...	...	...
Convulsion	...	...	...	9	0·53	...	1	...	...	6	4	1	...	1	...	...	...	...
Diseases of the spinal cord	1	...	...	3	0·90	...	2	1	...	1	...	...	...	...	6	...	2	3·56
Epilepsy	...	...	1	20	2·89	...	17	5	...	...	...	...	...	...	17	1	12	1·34
Vertigo	2	...	...	35	1·08	...	...	3	...	1	...	1	...	...	29	...	...	1·10
Meningitis	...	...	...	2	0·06	1	...	1	...	...	...	...	...	...	8	2	3	0·62
Headache	4	...	...	188	4·31	...	2	10	...	2	...	2	...	...	18	...	...	0·47
Neuralgia	...	...	...	36	1·40	...	...	1	...	...	...	2	...	...	23	...	1	0·65
Neuritis	2	...	1	18	1·12	...	4	2	...	...	...	...	...	...	31	1	1	1·75
Paralysis	...	...	...	17	1·42	...	4	...	...	...	...	1	...	...	42	1	7	3·61
Sciatica	3	...	...	59	4·18	...	5	1	...	2	...	5	...	...	128	...	4	5·75
Other diseases of the nervous system	3	...	...	44	2·43	1	21	4	...	3	...	4	...	1	53	2	3	2·26
Mental diseases.																		
Feeblemindedness	...	...	...	13	3·42	..	7	...	...	...	...	...	...	...	1	...	1	0·11
Hysteria	...	...	...	54	6·39	...	22	10	...	...	...	...	...	...	34	...	8	2·71
Involution (Melancholia)	...	...	...	1	0·80	...	4	...	...	...	...	...	...	...	1	...	1	0·31
Mania	...	...	...	1	0·25	...	1	...	...	...	...	...	...	...	15	1	8	1·62
Mental deficiency	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Neurasthenia	1	...	1	18	1·89	...	7	10	...	...	...	...	...	...	18	...	5	1·22
Schizophrenia (Dementia præcox)	...	...	...	20	9·02	...	31	...	...	...	...	...	...	...	10	...	8	1·48
Other mental diseases	1	...	1	38	11·02	...	26	8	...	...	...	4	...	1	25	2	8	2·75
Diseases of the eye.																		
Amblyopia and amaurosis	...	...	...	1	0·21	...	...	...	...	...	...	...	...	...	5	..	...	0·14
Anomalies of refraction	...	...	...	10	0·36	...	8	...	...	...	...	...	...	...	10	...	3	0·82
Blephritis	...	...	...	10	0·54	...	...	...	...	...	...	...	...	...	6	...	...	0·22
Conjunctivitis	4	...	...	105	2·83	...	...	2	...	24	...	2	...	...	725	...	...	21·58
Conjunctivitis granular (Trachoma)	...	...	...	1	0·38	...	...	...	...	...	...	...	...	...	230	...	7	13·06
Cataract	...	...	...	...	...	...	4	4	...	1	...	...	...	...	11	...	7	1·48
Glaucoma	...	...	...	1	0·02	...	...	...	...	...	...	...	...	...	1	...	...	0·07

Iritis	1	...	...	6	0·31	...	...	...	...	...	...	...	...	...	11	...	1	0·91
Keratitis	2	...	...	26	1·89	...	4	...	...	2	...	1	...	...	187	...	5	9·96
Retinitis	...	...	...	1	0·08	...	1	...	...	...	...	...	...	...	1	...	2	0·09
Other diseases of the eye	1	...	...	37	1·49	...	10	2	...	3	...	4	...	...	189	...	17	9·89
Diseases of the ear.																			
Inflammation of the external ear	4	...	...	248	6·39	...	...	2	...	5	...	2	...	...	101	...	...	2·69
Diseases of the middle ear	4	...	...	161	7·17	...	7	6	...	28	...	3	...	...	319	1	9	13·22
Furunculosis	7	...	...	247	5·78	...	...	3	...	5	...	2	...	...	81	...	...	2·35
Diseases of the mastoid process	1	...	...	5	2·72	...	4	2	...	3	...	...	...	...	16	1	...	1·52
Other diseases of the ear	...	...	...	4	0·21	...	...	2	...	...	...	1	...	...	11	...	...	0·60
Diseases of the nose.																			
Diseases of the Mucous membrane	8	...	...	366	7·13	...	...	8	...	17	...	9	...	...	639	...	...	11·31
Diseases of the bone and cartilage	...	...	...	1	0·01	...	...	1	...	...	...	...	...	...	...	...	...	...
Sinusitis	7	...	...	106	·75	...	3	5	...	2	...	2	...	...	23	...	...	1·10
Other diseases of the nose	4	...	...	154	4·81	...	...	5	...	1	...	3	...	...	14	...	...	0·54
Diseases of the circulatory system.																			
Diseases of the Valves	3	...		20	3·44	...	20	4	...	1	...	1	...	1	9	2	5	1·22
Disordered Action of the Heart	2	...	1	103	7·00	6	10	3	...	3	...	1	1	...	51	4	7	2·87
Diseases of Blood vessels	2	...	...	60	4·70	2	7	0	...	...	...	4	1	...	35	4	3	2·69
Endocarditis	1	...	2	5	0·82	2	3	1	1	1	...	...	...	...	4	1	2	0·25
Myocarditis	...	...	1	9	1 16	1	3	...	...	...	...	...	...	...	8	2	1	0·57
Pericarditis	...	...	...	3	0·31	...	1	...	...	...	...	...	...	...	3	...	2	0·16
Other diseases of the Circulatory system	...	...	... 1	4	0·24	3	1	1	...	...	...	1	...	...	4	2	1	0·29
Diseases of the Blood and blood forming organs.																			
Anæmia primary	...	...	...	4	0·36	...	1	2	...	1	...	...	...	...	17	...	1	1·36
Anæmia pernicious	...	...	...	...	...	...	...	...	...	...	...	...	...	...	4	1	3	0·58
Anæmia secondary	...	...	...	20	1·50	...	1	12	...	1	...	...	...	...	141	...	2	8·69
Dmiseases of the spleen	...	...	...	10	0·92	...	1	...	...	...	...	...	...	...	45	1	2	1·72
Lymphadenitis	5	...	...	182	11·70	...	...	6	...	27	...	...	...	...	153	...	2	11·94
Lymphangitis	...	...	...	16	0·51	...	1	1	...	...	...	3	...	...	13	...	1	0·46
Other blood diseases	...	...	...	17	1·93	...	...	1	...	...	...	...	...	...	13	3	4	1·20

TABLE XXVI—*contd.*

Diseases.	European Army of India.										Indian Army.					
	British officers attached to European troops. 2,227			Men. 52,646				Women. 4,178		Children. 6,552		British officers attached to Indian troops. 2,053			Men present. 116,984			
	A.	D.	Invalids.	A.	Constantly sick.	D.	Invalids.	A.	D.	A.	D.	A.	D.	Invalids.	A.	D.	Invalids.	Constantly sick.
Diseases of Glands of internal Secretion.																		
Goitre	...	...	...	13	1·25	...	2	3	...	...	...	...	...	...	13	...	2	0·93
Hyperthyroidism	...	...	...	10	1·64	...	4	2	...	1	...	...	...	...	2	...	1	0·25
Other diseases	...	...	...	1	0·10	...	1	4	...	...	...	...	...	...	1	...	...	0·01
Diseases of the Breast.																		
Mastitis	...	...	...	21	0·94	...	...	10	...	...	...	...	...	...	...	...	...	...
Other diseases	...	...	...	1	0 02	...	...	...	...	...	...	...	...	...	...	...	...	...
Diseases of the Respiratory System.																		
Asthma	...	...	...	32	2·10	...	6	20	...	4	...	...	...	...	59	1	6	2·94
Bronchitis	11	...	1	834	29·57	...	13	39	...	145	...	22	...	...	1,315	...	2	41·66
Empyema	...	...	...	2	0·52	...	1	...	...	1	...	...	...	...	...	...	...	...
Laryngitis	1	...	...	32	0·95	...	...	3	...	2	...	...	...	...	92	...	...	3·02
Pleurisy	3	...	...	88	6·04	...	2	5	...	2	...	...	...	...	217	2	19	18·91
Pneumonia:—																		
(*a*) Lobar	5	...	2	132	12·80	14	1	8	1	10	3	6	1	...	514	57	...	40·14
(*b*) Lobular (Broncho-pneumonia)	2	...	...	51	4·76	6	2	2	...	36	7	...	...	...	110	14	...	8·81
Other diseases	...	...	...	39	5·26	...	10	1	...	...	...	1	...	...	41	2	4	2·83
Diseases of the Teeth and Gums.																		
Caries of the enamel, dentine and cementum.	1	...	...	41	1·01	...	...	5	...	4	...	1	...	...	63	...	...	1·42
Gingivitis	...	...	...	31	0·88	...	...	3	...	1	...	3	...	...	118	...	...	3·11
Pyorrhoea alveolaris	6	...	...	45	1·25	...	...	4	...	2	...	2	...	...	88	...	...	2·46
Other diseases	...	...	...	15	0·61	...	...	1	...	8	...	1	...	...	21	...	...	0·57

Diseases of the Digestive System.																			
Appendicitis	20	...	1	385	25·80	7	3	47	...	13	...	24	1	...	191	6	2	12·62
Cholecystitis and cholangitis	3	...	...	33	2·85	...	1	7	...	1	...	3	1	...	24	1	2	1·93
Colic	2	...	...	163	3·45	...	...	6	...	5	...	5	...	...	147	...	...	2·93
Colitis	1	...	1	49	2·38	...	1	2	...	5	...	6	...	...	39	...	...	1·47
Constipation	6	...	...	339	6·96	...	...	28	...	58	...	6	...	...	398	...	...	6·01
Diarrhœa	60	...	...	859	20·01	...	...	36	...	125	2	28	...	...	726	...	...	16·64
Enteritis	14	...	...	97	2·84	...	...	3	...	42	10	4	...	...	17	...	...	0·66
Fistula in ano	4	...	...	7	0·44	...	...	1	...	...	...	2	...	...	34	...	1	3·42
Gastritis	22	...	...	357	14·50	...	1	24	...	9	6	18	...	...	146	...	1	5·72
Glossitis	1	...	...	1	0·01	...	...	...	...	...	...	...	...	...	7	...	...	0·30
Haemorrhoids (Piles)	4	...	...	205	8·75	...	...	2	...	...	...	2	...	...	189	...	...	9·47
Hepatitis acute	2	...	...	49	4·25	...	2	5	...	...	...	4	...	...	63	...	...	4·28
Hepatic abscess (Tropical abscess)	...	...	...	1	0·44	...	2	...	...	...	...	...	...	...	3	...	...	0·19
Hepatitis chronic (Cirrhosis)	...	...	...	3	0·29	3	...	3	...	3	...	6	...	...	91	...	4	7·37
Hernia	3	...	...	137	9·95	...	1	...	...	...	...	...	...	...	...	...	...	...
Hypertrophy of the tonsils	6	...	...	189	6·07	...	...	4	...	74	...	8	...	...	7	...	1	0·51
Indigestion	10	...	...	116	4·02	...	1	10	...	22	...	4	...	...	427	...	...	10·67
Intestinal obstruction	2	...	...	8	0·54	3	1	...	...	1	1	...	...	...	6	2	1	0·26
Inflammation of the palate and pillars of the fauces	...	...	...	...	...	...	...	1	...	...	...	...	...	...	1	...	...	0·02
Jaundice	...	...	...	27	1·36	1	...	...	...	...	...	9	...	...	55	...	...	2·93
Pharyngitis	12	...	...	462	9·18	...	...	8	...	11	...	9	...	...	2,329	...	...	44·82
Peritonitis	...	...	...	10	0·59	...	...	2	...	1	...	...	...	...	3	1	...	0·18
Quinsy	5	...	...	109	3·02	...	...	10	...	1	1	3	...	...	29	...	...	1·22
Sprue	1	...	2	6	1·13	...	4	7	...	...	...	...	...	...	3	...	2	0·62
Stomatitis	1	...	...	4	0·22	...	...	3	...	7	...	2	...	...	24	...	...	0·67
Tonsillitis	43	...	...	1,516	37·80	...	...	81	1	274	...	51	...	1	690	...	...	17·35
Other diseases	18	...	4	230	18·01	3	16	26	...	34	6	21	...	...	137	5	4	9·96
Diseases due to disorders of Nutrition or of Metabolism.																			
Beri-beri	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Diabetes mellitus	1	...	1	4	1·98	...	4	1	...	...	...	2	...	...	4	...	...	0·34
Gout	1	...	1	2	0·06	...	1	...	...	...	...	...	...	...	1	...	...	0·02
Inanition	...	...	...	7	0·35	...	1	...	...	27	5	1	...	...	3	...	...	0·19
Rickets	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...
Scurvy	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Other diseases	1	...	...	3	0·15	...	1	2	...	8	1	1	...	...	268	...	...	4·68
Diseases of the Male Organs of Generation.																			
Balanitis	...	...	...	109	3·59	...	...	...	...	...	...	...	...	...	11	...	...	0·50
Epididymitis	...	...	...	61	3·46	...	...	...	...	...	...	1	...	...	22	...	...	1·07
Hydrocele	1	...	...	37	2·07	...	...	...	...	...	...	1	...	...	33	...	...	2·04
Hypertrophy of the prostate	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	0·80
Orchitis	...	...	...	46	2·02	...	...	...	...	...	...	2	...	...	79	...	...	2·80
paraphimosis	...	...	...	13	0·72	...	...	...	...	2	...	...	...	...	6	...	...	0·80

TABLE XXVI—*contd.*

Diseases.	European Army of India										Indian Army.					
	British Officers attached to Europeans troops. 2,227			Men. 52,646				Women. 4,178		Children. 6,522		British officers attached to Indian troops. 2,053			Men present, 116,984			
	A.	D	Invalids.	A.	Constantly sick.	D.	Invalids.	A.	D.	A.	D.	A.	D.	Invalids.	A.	D.	Invalids.	Constantly sick.
Diseases of the Male Organs of Generation—contd.																		
Phimosis	1	...	...	122	5·33	...	...	...	...	35	...	...	...	...	28	...	...	1·71
Prostatitis	...	...	...	5	0·32	...	...	...	...	...	...	...	...	...	4	...	...	0·21
Stricture of the urethra	...	...	...	2	0·11	...	...	...	...	...	...	...	...	...	2	...	...	0·36
Urethral fistula	...	...	...	1	0·05	...	...	...	...	...	...	...	...	...	1	...	...	0·03
Urethritis	...	...	...	245	15·58	...	...	...	...	...	...	1	...	...	80	...	...	2·45
Varicocele	1	...	...	59	3·54	...	...	...	...	...	...	2	...	...	20	...	1	1·12
Other diseases	2	...	...	16	0·64	...	...	...	...	2	...	...	...	...	5	...	...	0·27
Diseases of the Female Organs of Generation.																		
Abortion	...	...	...	...	...	...	...	121	...	...	...	...	...	...	...	...	...	...
Affection connected with pregnancy and Parturition and consequent on parturition	...	...	...	...	...	...	...	81	5	...	...	...	...	...	...	...	...	...
Diseases of the ovary	...	...	...	...	...	...	...	4	...	...	...	...	...	...	...	...	...	...
Diseases of the fallopian tube	...	...	...	...	...	...	...	8	...	...	...	...	...	...	...	...	...	...
Displacements and distortions of the uterus	...	...	...	...	...	...	...	26	...	...	...	...	...	...	...	...	...	...
Dysmenorrhœa	...	...	...	...	...	...	...	5	...	1	...	...	...	...	...	...	...	...
Endometritis	...	...	...	...	...	...	...	21	...	...	...	...	...	...	...	...	...	...
Haemorrhage connected with parturition	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Inflammation of vagina	...	...	...	...	...	...	...	3	...	1	...	...	...	...	...	...	...	...
Menorrhaegia	...	...	...	...	...	...	...	21	...	...	...	...	...	...	...	...	...	...
Metrorrhaegia	...	...	...	...	...	...	...	5	...	...	...	...	...	...	...	...	...	...
Pelvic peritonitis	...	...	...	...	...	...	...	2	...	...	...	...	...	...	...	...	...	...
Other diseases peculiar to women	...	...	...	...	...	...	...	40	1	1	...	...	...	...	...	...	...	...

Diseases affecting Child—																								
Asphyxia of child	...	...	...	...	...	...	...	...	...	4	5	...	...	...	...	...	...	...						
Injury to child	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...						
Premature birth	...	...	...	...	...	...	...	...	...	3	6	...	...	...	...	...	...	...						
Still-birth	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...						
Diseases of Bones, Joints, Muscles, Fascia and Bursae.																								
Arthritis	1	...	...	36	2·67	...	8	3	...	1	...	2	...	...	67	1	13	5·07						
Diseases of the spine	...	...	...	8	1·21	...	2	...	...	1	...	...	...	...	4	...	1	0·40						
Flat foot	...	...	...	17	0·67	...	5	...	...	...	...	1	...	1	3	...	3	0·07						
Hammertoe	2	...	...	40	2·98	...	1	1	...	1	...	...	...	...	...	...	...	...						
Myalgia	3	...	...	245	6·48	...	...	8	...	2	...	1	...	...	288	...	...	6·63						
Osteo-myelitis	...	...	...	27	4·53	...	5	...	...	4	...	...	...	...	15	1	6	2·68						
Periostitis	...	...	..	20	1·36	...	...	...	...	...	...	...	...	...	28	...	...	1·78						
Synovitis	3	...	1	516	21·80	...	6	3	...	...	...	4	...	...	323	...	8	15·72						
Other deformities of limbs	...	...	...	25	1·28	...	6	1	...	2	...	...	...	...	3	...	...	0·04						
Other diseases	12	...	3	389	26·34	..	32	7	...	3	...	10	...	...	306	1	22	16·23						
Diseases of the areolar tissue.																								
Boil	8	..	..	473	14·02	...	...	1	...	7	...	9	...	...	696	...	...	19·11						
Carbuncle	1	..	..	19	0·55	...	...	...	...	...	...	2	...	...	21	...	...	1·11						
Cellulitis	55	..	.	2,123	74·24	1	...	35	...	76	..	35	...	1	2,453	...	2	84·02						
Cellulitis suppurative (abscess).	4	..	..	174	7·61	...	...	12	...	6	...	4	...	...	407	...	...	16·05						
Other diseases	...	..	1	35	1·61	...	1	2	...	1	...	...	...	...	9	...	...	0·31						
Diseases of the Skin.																								
Acne	1	..	..	20	0·94	...	1	...	...	...	...	...	...	...	18	...	...	0·40						
Dermatitis	2	..	.	236	13·54	...	4	2	...	4	...	1	...	...	363	...	1	16·86						
Eczema	2	..	.	103	6·35	...	...	5	...	1	...	...	...	...	279	...	...	12·78						
Favus	...	...	.	...	...	...	...	...	...	...	...	...	...	...	2	...	1	0·18						
Herpes Zoster	...	...	..	37	1·10	...	...	...	...	...	...	...	...	...	85	...	...	2·68						
Impetigo	1	...	..	395	19·05	...	...	1	...	15	...	...	...	...	86	...	1	3·65						
Ingrowing toe nail	...	...	.	139	4·52	...	...	2	...	1	...	1	...	...	4	...	...	0·17						
Onychia	...	...	.	10	0·31	...	...	...	...	...	...	...	...	...	2	...	...	0·03						
Prickly heat	...	...	.	24	0·98	...	...	...	...	...	...	...	...	...	12	...	...	0·27						
Psoriasis	...	...	..	17	0·94	...	...	...	...	1	...	1	...	...	36	...	...	2·82						
Sycosis (Folliculitis)	...	...	..	29	2·02	...	...	...	...	...	...	...	...	...	22	...	...	1·29						
Tinea	3	...	..	582	21·42	...	...	...	...	...	..	...	...	...	376	...	1	12·89						
Urticaria	3	...	1	51	1·75	...	...	...	...	...	..	3	...	...	117	...	...	3·29						
Wart	...	...	...	30	1·54	...	...	...	...	1	...	...	...	...	16	...	...	0·75						
Whitlow	1	...	..	60	1·88	...	...	1	...	...	...	...	...	...	114	...	...	4·37						
Other diseases	1	...		132	6·25	...	3	2	...	3	...	...	...	...	52	...	...	2·82						

TABLE XXVI—*concld.*

Diseases.	European Army of India.										Indian Army.					
	British Officers attached to European troops. 2,227			Men. 52,			Women. 4,178		Children. 6,522		British Officers attached to Indian troops. 2,053			Men present. 116,984			
	A.	D.	Invalids.	A.	Constantly sick.	D.	Invalids.	A.	D.	A.	D.	A.	D.	Invalids.	A.	D.	Invalids.	Constantly sick.
Diseases of the Urinary Organs.																		
Calculus—																		
(*a*) Bladder	...	...	...	...	...	...	...	...	...	...	...	1	...	...	6	...	...	0·54
(*b*) Kidney	...	...	...	12	1·41	...	3	...	...	...	...	...	...	...	5	...	...	0·27
(*c*) Ureter	...	...	...	5	0·92	1	...	2	...	...	...	4	...	1	27	1	1	2·18
Cystitis	6	...	...	46	2·99	...	2	16	...	1	...	2	...	...	22	...	1	1·59
Haematuria	3	...	1	57	3·48	...	1	...	...	...	...	1	...	...	4	...	...	0·15
Incontinence of urine	...	...	...	3	0·10	...	...	2	...	1	...	...	...	...	...	...	...	0·18
Nephritis acute	...	...	...	11	2·82	3	3	...	...	1	...	..	...	...	14	1	4	1·37
Nephritis chronic	...	...	...	1	0·10	...	...	4	...	...	...	...	...	...	...	...	...	...
Pyelitis	1	...	...	48	3·76	...	...	11	...	20	...	4	...	...	31	...	...	2·30
Renal colic	1	...	...	45	2·12	...	...	4	...	...	...	3	...	...	134	...	...	4·22
Other diseases	4	...	2	97	6·16	...	3	6	1	4	...	2	...	...	79	1	2	4·26
General Injuries.																		
Burns and scalds	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Effects of anti rabic treatment.	1	...	...	...	0·16	1	...	1	...	...	...	1	...	...	...	...	...	...
Effects of inoculation	...	...	...	14	0·20	...	...	...	...	...	...	3	...	...	2	...	...	0·03
Heat exhaustion	...	...	...	39	1·33	1	...	...	...	...	...	1	...	...	17	...	...	0·33
Heat stroke	...	...	...	13	0·57	3	...	...	...	...	...	...	...	...	2	1	...	0·02
Sun stroke	1	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...
Other injuries	4	5	1	19	0·72	14	...	2	2	1	...	2	...	1	19	13	...	0·68
Local Injuries.																		
Abrasions	5	...	...	167	4·47	...	...	1	...	4	...	6	...	...	231	...	...	5·92
Burns and scalds	3	...	...	78	2·81	...	...	3	...	9	...	2	1	...	169	1	1	7·00
Concussions	19	1	...	146	7·56	...	3	1	...	6	...	7	...	...	43	...	2	2·11

Contusions	22	...	...	687	20·71	...	1	3	...	...	...	14	...	...	1,931	3	10	61·42
Dislocation and displacements.	6	...	...	117	5·78	1	3	...	..	...	...	5	...	...	102	3	3	6·60
Fractures	34	2	6	761	57·53	9	27	10	...		1	26	2	...	1,279	15	74	102·00
Sprains and strains	20	...	...	866	25·79	...	2	5	...	...	...	13	...	...	761	...	...	23·99
Wounds gun-shot	1	...	1	28	1·39	6	7	...	...	...	...	2	...	...	31	5	14	3·95
Wounds others	8	...	1	250	8·98	2	4	2	...	15	...	9	...	...	1,481	3	4	55·88
Injuries self inflicted	1	4	...	4	0·00	12	...	...	...	...	...	...	...	...	2	3	...	0·01
Other injuries	4	...	...	119	6·97	1	12	3	...	2	...	7	...	...	103	8	11	5·86
Tumours and Cysts.																		
Carcinoma	...	...	...	1	0·02	...	1	14	2	...	...	1	...	...	2	1	...	0·15
Cysts	3	1	...	81	3·08	...	...	7	...	2	...	1	...	...	98	...	...	3·59
Sarcoma	...	...	...	4	0·53	1	2	...	...	1	...	...	...	...	5	2	1	0·34
New growths malignant (other cases).	2	1	2	32	1·75	...	...	1	...	...	...	1	...	...	6	1	2	0·58
New growths non-malignant	1	...	1	25	1·30	...	2	...	...	...	...	1	...	...	58	1	3	4·53
Malformations	1	...	...	10	0·50	...	...	1	...	3	...	...	...		12	...	1	1·16
Poisons.																		
Alcohol	...	...	...	2	0·05	1	...	...	...	...	...	...	...	...	1	...	...	0·01
Arsenic	...	...	...	1	0·00	1	...	..	...	...	...	...	...	...	4	1	...	0·49
Chloroform	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Other chemical poisons	1	...	...	3	0·09	...	...	...	...	2	...	...	...	...	3	...	...	0·17
Opium	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...
Venom of insects	...	...	...	2	0·06	...	...	...	...	...	...	...	...	...	6	...	...	0·10
Venom of Ophidia (Snake bite).	...	...	...	1	0·01	...	...	...	...	...	...	...	...	...	7	...	...	0·44
Other poisons	...	...	...	...	..	...	...	...	...	1	...	1	...	...	3	1	.	0·03
No appreciable diseases	...	...	...	145	5·34	...	...	35	...	19	...	1	..	...	*75	...	...	3·01
All other causes	...	...	...	10	0·45	...	...	1	...	17	...	...	...	...	2	...	...	0·03
Total	973	14	52	30,301	1,399·21	129	572	1,369	14	2,025	83	750	9	11	49,703	252	643	1,798·00

* Includes 11 cases of carriers.

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